Appendix C:

Water Supply Report

WATER SUPPLY REPORT

GREGORY CANYON LANDFILL
SAN DIEGO, CALIFORNIA

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PREFACE

This report was prepared to provide additional documentation regarding the water supply needs of the proposed Gregory Canyon Landfill (GCLF) project. It was developed in response to a court order related to this portion of the Final Environmental Impact Report (FEIR) for the GCLF project. This report incorporates technical data and an analysis of the available on-site water resources and presents potential off-site water resources for the project and actions to accommodate use of off-site water resources. In addition, this report includes an evaluation of potential impacts associated with the use of both on-site and off-site water resources over the life of the landfill.

To date, there have been more than six phases of geologic and hydrogeologic characterization. Initial site characterization was completed by Geotechnical Consultants, Inc. (GCI) for the County of San Diego and the U.S. Department of Interior (GCI, 1989). The second and third phases were completed by Geraghty and Miller (G&M, 1988, 1990). The fourth phase included the work of Woodward-Clyde Consultants completed in 1991 and reported in 1995 (WCC, 1995). The fifth phase included a hydrogeologic study completed by GeoLogic Associates (GLA, 1997), and the sixth phase addressed geotechnical issues (GLA, 1998 and 1999). In support of the EIR and subsequent Joint Technical Document (JTD) for the GCLF project, or in response to comments received on the draft EIR, GLA has also completed additional supplemental studies and reports. The major project reports pertaining to the site hydrogeology are provided below.

1. Geotechnical Consultants, 1989, Preliminary assessment of geologic and hydrogeologic conditions, Gregory Canyon site: Draft Environmental Impact Report, Environmental Impact Statement for the North County Class III Landfill, San Diego County, California.

2. Geraghty & Miller, 1988, Phase I hydrogeologic investigation - Proposed North County Landfill, San Diego, California: Consultant's report to Waste Management of North America, Western Region.

3. Geraghty & Miller, 1990, Phase II investigation - Proposed Gregory Canyon Class III Landfill, San Diego County, California: Consultant's report to Waste Management of North America, Western Region.

4. Woodward-Clyde, 1995, Geology and hydrogeology report, Gregory Canyon Landfill, Pala, San Diego County, California: Consultant's report to Gregory Canyon Ltd. (March, 1995).

5. GeoLogic Associates, 1997, Phase 5 - Hydrogeologic investigation for the Gregory Canyon proposed landfill site: Consultant's report to Gregory Canyon Ltd.

6. GeoLogic Associates, 1998, Phase 6 - Geotechnical investigation for the Gregory Canyon proposed landfill site: Consultant's report to Gregory Canyon Ltd.

7. GeoLogic Associates, 2001, Addendum to Geotechnical Investigation of the Proposed Access Road and Bridge over San Luis Rey River, April.

8. GeoLogic Associates, 2001, Phase 5 Supplemental investigation, results of pumping tests, January.

9. GeoLogic Associates, 2003, Geologic, hydrogeologic, and geotechnical investigations report, September.

10. GeoLogic Associates, 2004, Supplemental hydrogeologic investigation report, October.

This water supply technical report is divided into three sections. Following an introductory section describing the regional and site hydrogeologic setting, Section 2 presents a discussion of the available on-site bedrock (percolating) groundwater resources, within the limits of the Gregory Canyon property and the calculated safe yield for water supplied from the bedrock system for daily project water needs. Section 3 provides a discussion of off-site water resources and in particular the use of disinfected tertiary-treated recycled water and permitting requirements for the use of this recycled water for the GCLF. Section 4 presents an evaluation of cumulative impacts to water service and facilities. Section 5 presents conclusions related to the impacts associated with the use of on-site and off-site water resources for the project.

1.0 INTRODUCTION

Gregory Canyon is located in an area dominated by crystalline rocks, which make up the area's steep topography, with intervening alluvial valleys. Most of the area is undergoing erosion and mass wasting, but the major river valleys, such as the San Luis Rey River valley, have thick accumulations of sediments, referred to as alluvium. The alluvium undergoes cycles of deposition and erosion, depending on the water flow in the drainage system, typically with low flows during the summer months and variable flows during the winter rainy season. Limited groundwater exists in the fractures within the crystalline rocks compared with the groundwater stored in alluvial sediments. The following sections provide a discussion of the hydrogeologic characteristics in the region surrounding Gregory Canyon and on site.

1.1 REGIONAL HYDROGEOLOGIC SETTING

The Gregory Canyon watershed is tributary to the San Luis Rey River and is part of the San Luis Rey Hydrologic Unit (Figure 1). This hydrologic unit encompasses a semi-rectangular area of about 565 square miles. The San Luis Rey River occupies a narrow valley in the basin that is filled with water-bearing alluvial sediments bounded by sedimentary rocks in the lower reach of the basin, and igneous and metamorphic rocks in the middle and upper reaches. The alluvial deposits along the San Luis Rey River form narrow elongated groundwater basins. The San Luis Rey Hydrologic Unit has been subdivided into three hydrologic areas from east to west, which include the Warner, Monserate and Lower San Luis (Mission). The Monserate Hydrologic Area occupies approximately the middle one-third of the San Luis Rey Hydrologic Unit and is the closest to the proposed landfill. The Monserate Hydrologic Area is further subdivided into three hydrologic subareas which include from east to west, the La Jolla Amago, Pauma and Pala Hydrologic Subareas (RWQCB, 1994). Groundwater moves from east to west, downgradient from the Pauma Basin to the Pala Basin and then to the Bonsall Basin of the Lower San Luis Hydrologic Area. The boundaries of each basin are drawn where the basement complex (hard crystalline rock) is exposed at the surface and where distinct bedrock constrictions in the San Luis Rey Valley segment the valley fill.

Because groundwater recharge is seasonal and inconsistent, groundwater levels in the valley fluctuate. Historical depth-to-water measurements from the period between 1965 to 1990 for the alluvial aquifer indicate depth to groundwater ranges from the ground surface (in the river) to approximately 25 feet below ground surface (bgs) [California Department of Water Resources (CDWR) 1971; U.S. Geological Survey (USGS) 1990].

The GCLF site is located to the south and adjacent to the Pala Basin boundary (Figure 2). The Pala Basin covers approximately 4,500 acres, being nearly eight miles long and averaging about 0.5 miles in width (NBS Lowry, 1995). Total thickness of the alluvial sediments in the Pala Basin ranges from zero at the basin margins to in excess of 165 feet, under the proposed GCLF bridge crossing (GLA, 2001). A study by the USGS (Moreland, 1974) estimated the maximum depth of the alluvium in the Pala Basin at 244 feet (in one well 9S/2W-26G1 located in the far upper reach of the Pala Basin), and an average depth of 150 feet. At well GMW-3 (Figure 3), located near the southern edge of the Pala Basin at the mouth of Gregory Canyon, the alluvium is a minimum of 50 feet thick (to total depth drilled).

Due to an abundance of coarse sand and gravel deposits and minimal clay, the best recharge areas are located in the central and west-central portions of the basin (NBS Lowry, 1995). Reported well yields for alluvium in the Pala Basin from a study by NBS Lowry (1995) indicate rates of production range from 300 gpm to 1600 gpm. Specific capacities for alluvium along the axis of the basin range from 13 gallons per minute per foot (gpm/ft) to greater than 115 gpm/ft of drawdown (Moreland, 1974). Hydraulic conductivities range from 750 gpd/ft^2 to 1000 gpd/ft^2 (100 to 135 ft/day).

Granitic and metamorphic crystalline rocks underlie the valley fill and adjacent slopes. Groundwater occurrence and movement in the bedrock medium depends upon fracture size, aperture, density, and interconnection, rather than matrix properties as in alluvial soils. Though it is common usage to speak of a bedrock "aquifer" (as distinct from the alluvial aquifer), wells penetrating fractures containing groundwater are not typically a dependable source of water for large-scale agricultural, municipal or industrial uses. Wells within valleys and canyons where surficial deposits are absent or minimal generally yield only small quantities of groundwater (typically less than 5 gpm to about 20 gpm). These results are proportional to the relative porosity of the two media (25-50% for alluvium, and 0-10% for fractured crystalline rock). The variations in the range of production provide a context for distinguishing between the two types of groundwater occurrence, although there has been little attempt to quantify the properties of the bedrock flow system regionally. In fact, the Pala Basin as defined by the CDWR (1971) does not include the adjacent bedrock.

Water Resources. The San Diego County Water Authority (SDCWA) is a public agency that was founded in 1944 to supplement existing supplies by importing water into the San Diego Region. In response to continued demand for water and the decreased reliability of imported water sources, SDCWA has been evaluating the potential to develop additional local water supplies and water storage. To this end, SDCWA is considering water conservation, water transfers, water reclamation and purification, and groundwater resource development and management. SDCWA developed a Groundwater Resource Development Report (June 1997) to assist in developing a Groundwater Implementation Plan and to serve as a reference and resource document to be updated periodically. In this report, the Mission, Bonsall, Pala and Pauma basins within the San Luis Rey River Basin, were considered (among others) as productive shallow alluvial aquifers within the SDCWA service area.

SDCWA assigned a high score to the Pala/Pauma Basins, along with several other groundwater basins and surface reservoirs, during its initial "Regional Screening of New Sources of Water." Accordingly, these basins were targeted for further analysis under the "Analysis of Alternatives". The resulting analysis of alternatives ranked the groundwater basins including the Pala/Pauma groundwater basins in a lower group (less attractive), and therefore they were not considered further as a viable new source of water. The primary reasons for the low ranking included very low groundwater elevations that would require extensive pumping facilities for water conveyance, relatively little emergency storage capacity, and the need for extensive infrastructure including wells and connecting pipelines throughout the basin.

Water Quality. Water quality data for wells in the Pala Hydrologic Subarea are sparse. One key indicator of groundwater quality is the total dissolved solids (TDS) concentration. For aesthetic reasons, the state has established a recommended TDS concentration of 500 mg/L in drinking water supplies, with an upper limit of 1000 mg/L. Currently, TDS concentrations in SDCWA imported supplies range from about 500 to 700 mg/L (SDCWA, 1997). Based on available groundwater quality data, the alluvial aquifer in the Pala Basin is good, with groundwater concentrations of TDS estimated in the range of 200 to 860 mg/l (Moreland, 1974) compared with 600 to 3,400 mg/l TDS for the Bonsall Basin, the next basin downgradient of the Pala Basin within the San Luis Rey River valley.

1.2 SITE HYDROGEOLOGY

Gregory Mountain is an elongated, relatively flat-topped prominence, drained to the east, north and west (into Gregory Canyon) by steep, rocky secondary canyons. The potential catchment area of the mountain is large and it clearly dominates recharge to Gregory Canyon. Recharge to Gregory Canyon from the west ridgeline and southern drainage divide is believed to be relatively minimal. Though no permanent springs have been identified in Gregory Canyon, the presence of some riparian vegetation along the thalweg of the canyon, and its tributaries, suggests that the piezometric level of the underlying aquifer is close to the surface along the lowest points of the canyon. Studies by GLA and others, including the drilling, construction and testing of groundwater monitoring wells, have assisted in evaluating groundwater flow within the project area.

There are two distinct groundwater zones within Gregory Canyon; an alluvial aquifer hosted by the sediment wedge at the mouth of the canyon and thickening northward toward the San Luis Rey River, and a crystalline bedrock fracture flow system hosted by the fractured tonalite that forms the substrate of the canyon. The general direction of groundwater movement in both aquifers is northerly, toward the alluvial aquifer of the San Luis Rey River (Figures 4A and 4B).

Alluvial Aquifer. Two alluvial units have been mapped at the lower elevations near the mouth of Gregory Canyon, which form a wedge of sediments in the lower reaches of Gregory Canyon. The younger unit, Qal-1 is formed by overbank deposits from the active San Luis Rey river channel, which are interbedded with channel deposits from the Gregory Canyon drainage. These deposits are relatively thin and contain gravels, cobbles and boulders, supported by a sandy silt matrix. The older alluvial subunit, Qal-2, is a terrace remnant of older alluvium from the Gregory Canyon drainage.

Figure 4A shows a contour map of the water table in the alluvial aquifer based on data collected on April 5, 2005 (the most recent time when significant groundwater was measured in the on-site alluvial wells). This alluvial wedge pinches out to the south before reaching the proposed landfill footprint. It thickens to the north until eventually it merges with the channel deposits of the San Luis Rey River. Well GMW-3, near the mouth of the canyon, encountered a minimum 50-foot section of alluvial deposits (to the total depth drilled) and has been identified as an alluvial well to be used for water quality monitoring of the site. The other alluvial wells within the vicinity of Gregory Canyon include wells MW-3, WCC-1, and WCC-2. However, it should be noted that only wells GMW-3 and MW-3 have contained measurable groundwater, while well WCC-2 has never contained measurable groundwater. WCC (1995) concluded that groundwater within the alluvium forms an unconfined aquifer recharged primarily by direct infiltration from precipitation or runoff from the bedrock ridges east and west of the canyon. The available data suggest groundwater flow is northerly, at a gradient of about 0.02 ft/ft.

As stated above, the reported hydraulic conductivities for the coarse sand and gravel deposits within the Pala Basin range from 750 to 1,000 gpd/ft^2 (100 to 135 ft/day) (Moreland, 1974). In contrast to this more coarse-grained sediment typical of the Pala Basin as a whole, WCC (1995) estimated that the hydraulic conductivity of alluvial and colluvial materials in Gregory Canyon ranges between 0.9 and 16 gpd/ft^2 (0.12 to 2.14 ft/day) Supporting this lower local value, Geraghty & Miller (1990) performed a pumping test in well GMW-3 and estimated the transmissivity of the alluvial aquifer using the Cooper-Jacob method, at 700 gpd/ft, and from this value the hydraulic conductivity was estimated to be approximately 11 gpd/ft^2 (1.47 ft/day). These lower hydraulic conductivity values are consistent with the finer overbank deposits identified in the boring log and typical of the basin margin areas.

Bedrock Fracture Flow System. The bedrock to the south, outside of the Pala Basin, includes the Bonsall Tonalite, which describes the rocks underlying the western ridge adjacent to Gregory Canyon, and the Indian Mountain Leucogranodiorite describing the light-colored, bold outcrops of granitic rock underlying the eastern ridge of the site area and an intervening band of metamorphic rock along the lower slopes of the eastern ridge, which probably are best correlated with the Jurassic Santiago Peak volcanics. Detailed descriptions of each of these bedrock units is provided in the geologic, hydrogeologic, and geotechnical investigations report prepared by GLA (September, 2003).

There are 25 bedrock monitoring wells within the proposed landfill footprint and along the periphery of the site, constructed during various investigative phases of the project (Figure 4B). Studies conducted to date indicate that groundwater in Gregory Canyon can be characterized as a fracture-controlled, interconnected flow system. Results obtained from pumping tests of Gregory Canyon bedrock well GLA-3, likely one of the most productive well within Gregory Canyon, identify a calculated hydraulic conductivity value of approximately 45 gpd/ft^2 (6 ft/day).

Wells accessing the water-bearing fractures register water levels defining a systematic piezometric surface (Figure 4B). Flow apparently is enhanced even by a moderate degree of rock decomposition and mineral vein dissolution. As interpreted from drilling logs, the zone of weathering in the bedrock is deeper along the invert of Gregory Canyon and shallows on the sidewalls. Relatively significant water producing zones are mostly located in the weathered zone in wells near the canyon axis. In contrast, flow in unweathered rock is more limited in terms of both quantity and occurrence of producing fractures. In fact, four wells (GLA-4, GLA-9, GLA-17 and GMP-3) drilled along the west ridgeline to depths significantly below the projected equipotential surface are dry (one well, GLA 4, is recharged by a perched water condition), and other wells drilled in unweathered bedrock underlying the northern extension of the western ridgeline (in the low-permeability zone shown on Figure 4B) recharge very slowly from relatively isolated fractures. Therefore, the western ridgeline is believed to form a groundwater flow barrier. Figure 4B shows that fracture flow below the equipotential surface is west-northwest at a relatively steep gradient of about 0.14 ft/ft in the upper portions of the canyon to about 0.09 ft/ft closer to the bottom of the canyon. Groundwater flows from the Gregory Mountain recharge area to Gregory Canyon; occurs largely in the weathered zone; and is bounded by unweathered tonalite under the western ridgeline. Derivation of a piezometric surface from wells isolated from one another by non-water bearing rock attests to the hydraulic interconnection of the fracture system.

The water level in the alluvium adjacent the bedrock, which fluctuates seasonally and with climatic intervals, is the local base level of the equipotential surface. During wet periods, whether considered on an annual or decadal basis, water levels rise in the alluvial aquifer at the mouths of adjoining canyons, and the adjacent equipotential surface expands as the bedrock's fracture system fills. During the years that preceded the second highest recorded year of precipitation in 2005, the water level in the alluvial aquifer dropped below the screen levels of wells at the mouth of Gregory Canyon, and the bedrock equipotential surface also contracted.

2.0 ON-SITE WATER RESOURCES

Groundwater outside of the Pala Basin is derived primarily from the infiltration (percolation) of rainfall and surface water runoff into open fractures within the otherwise impermeable crystalline bedrock, and is defined as percolating groundwater. This section presents a discussion of the available percolating (bedrock) water resources on the GCLF property and provides an analysis of the long-term safe yield from the bedrock wells for project water uses.

2.1 PROJECT WATER SUPPLY REQUIREMENTS

As presented in the FEIR (Section 4.15.3.3), the GCLF water demand includes daily operational needs of 0 to 30,000 gallons per day (gpd) of water for dust control and 0 to 10,000 gpd of water for ancillary use, landscape irrigation and fire protection (if needed). Operation of the landfill will use about 40,000 gpd of water, or about 38 acre-feet per year. The actual water demand will vary depending on the weather conditions and the time of year, with very little water use for dust control and irrigation on rainy days. In contrast, very dry days such as those occurring during the Santa Ana winds, would require a higher amount of water usage. The landscape irrigation will be limited to small areas of permanent landscaping at the landfill entrance and around the administrative facilities, as well as within the proposed biological mitigation sites. Other landscaped areas will use non-irrigated, drought tolerant native vegetation, which would be watered only at planting and during the initial establishment period. Fire protection water will be supplied by water within an on-site storage tank.

During periodic construction of new lined sections of the landfill, however, an additional 125,000-165,000 gpd of water is estimated for installation of the clay liner and for ancillary uses, for a maximum water use of about 205,000 gpd during periods of simultaneous construction and operation.

Based upon the landfill location, primarily underlain by bedrock, on-site water resources available to meet the projects water demands will include the use of percolating (bedrock) water (i.e., water supplied from areas outside of the Pala Basin that are considered to be comparably impermeable with limited groundwater occurring within the fractured crystalline bedrock). It is proposed that the on-site percolating water be used anywhere at the landfill location.

The project will prioritize the allocation of water needs of the project, as much as is practical. Only a limited amount of water is needed to support the establishment of the plant community as part of the project habitat creation program within the San Luis Rey River valley, for permanent landscaping at the entrance of the landfill, or for dust control on the access road, all of which are situated within the alluvial basin portion of the site. On-site percolating water will be used first for these areas and small areas of permanent landscaping around the administrative offices, and daily operational applications including dust control within the ancillary facilities and along the haul roads and the borrow/stockpile areas, portions of which may be underlain by either bedrock or the margins of the alluvial basin. In this way, off-site water can be applied more broadly as operational water within the landfill footprint and during periodic construction phases of the project, although it will be available to support the entire project's water needs. Bottled potable drinking water will be supplied for personnel use at the landfill.

2.2 GREGORY CANYON ALLUVIAL AQUIFER/BEDROCK GROUNDWATER SYSTEMS

The proposed landfill site is located in Gregory Canyon, a north-draining tributary canyon to the San Luis Rey River valley (Figure 1). In the lower portions of Gregory Canyon, a thin veneer of unconsolidated residual soils, colluvial, and alluvial deposits mantle a substrate of weathered tonalite. The topographic highs bounding the canyon are formed by igneous intrusive and metamorphic rocks with varying degrees of weathering.

The California State Department of Water Resources (CDWR) Bulletin 118 entitled *California's Groundwater*, defines a groundwater basin as an area underlain by permeable material capable of furnishing a significant supply of groundwater to wells or storing a significant amount of water (CDWR, 1975). The DWR has delineated the limits of each groundwater basin in two dimensions, developed initially on the presence and areal extent of unconsolidated alluvial soils from area geologic maps. Well completion reports for wells in basin areas were then used to identify the top of the water table and the top of impermeable bedrock. If less than 25 feet of permeable material was present or if there was no groundwater within the permeable material, the area was eliminated from the map. The well completion reports were also used to determine if water supply wells located within the basin area were extracting groundwater from permeable materials or from bedrock beneath the permeable material. If the wells only extracted groundwater from the bedrock, the area was eliminated from the map. If an area lacked well information, the areas were retained from the areal geology until additional information could be collected. Figure 2 is a map developed from the CDWR (1975) showing the approximate limits of the Pala Basin, the alluvial basin occupied by the San Luis Rey River and located to the north of Gregory Canyon. Wells GMW-3 and MW-3 are screened within saturated alluvium, though measured water levels in well MW-3 indicate that this well has a maximum of about 11 feet of saturated alluvial section (in April 2005), and less than three feet typically.

For the Gregory Canyon area of the site, well GMW-3 is the northernmost well in the mouth of Gregory Canyon, and screened over the thickest section (50 feet minimum) of alluvial sediments to its total depth. Based on the screened interval within the alluvium, this well is being defined as an alluvial well, although the hydraulic conductivity of this well (11 gpd/ft^2) is less than has been calculated in several of the bedrock wells, and likely would not produce a significant supply of groundwater. This lower hydraulic conductivity result is likely associated with the finer-grained sediments deposited on the margins of the valley. Therefore, it is located at the approximate southern limit of the Pala Basin within Gregory Canyon.

Groundwater occurrence and movement in bedrock depends upon fracture size, frequency, aperture, density and interconnection, rather than matrix properties as in alluvial soils. Borehole dilution testing was performed by COLOG, Inc. (GLA, 1997), to determine the transmissive intervals within the fractured bedrock in 11 open boreholes on the project site. COLOG, Inc. adapted the borehole dilution method, using de-ionized water as the tracer and periodic measurements of the ambient temperature and fluid electric conductivity (FEC) as measures of "concentration" of the tracer. Once borehole water has been diluted with the deionized water to reduce the FEC and create thermal equilibrium, changes in the temperature and the FEC assist in locating hydraulically transmissive zones in the bedrock, and calculating the average velocity of the groundwater moving from these zones into the open borehole. The results obtained by COLOG, Inc. after applying this technique in the logging of the 11 wells are summarized below.

1. As shown in the following table, in shallow wells (e.g., GMW-1, GMW-4, and GMP-2), and in the shallow portions of wells GLA-5 and GLA-7, the transmissive intervals are broad and continuous, consistent with the deeply weathered nature of the tonalite.

Well	Depth to water (feet)	Depth of transmissive interval (feet)	Specific discharge (ft/day)	Open/Screened Interval (feet)
GMW-1	21.89	65-83	0.26, 0.31	48–90.5
GMW-4	65.72	66-74	0.11-0.13	55-116
GMP-2	69.54	70-86	0.14-0.18	45-87.5
GLA-5	42.57	43-66	0.05	30-190
GLA-7	34.82	35-72	0.16-0.24	30-160

2. As shown in the following table, in the deeper portion of the GLA wells, where the tonalite is less weathered, there are very few transmissive intervals. They range in thickness between 2 and 8 feet, and represent between 1% and 5% of the total length of the bedrock section. These results are indicative of fracture flow.

Well	Depth to water (feet)	Depth of transmissive interval (feet)	Specific discharge (ft/day)	Open/Screened Interval (feet)
GLA-1	37.10	ND	ND	20-300
GLA-2	69.73	83-85	0.17	70.38-95.38
GLA-3	23.84	66-70/ 82-84	0.23/ 0.29	45-100
GLA-4	68*	70-72, 126-134	0.03/0.07	30-240
GLA-5	42.57	96-99	0.06	30-190
GLA-8	62.40	175-180	--	15-300
GLA-10	22.20	58-64	0.02	50-57

Note:
* The static depth to water was 149.93 feet bgs, but the transmissivity of the well was so low that water added during testing did not drain. Thus, the reported transmissive intervals and specific discharge values are transient.

3. For the deep GLA wells, in all but one instance the intervals of groundwater flow is within fractures in more weathered bedrock, within 60 feet of the piezometric surface. Groundwater flow is largely concentrated in discrete shallow fracture zones. Deeper fractures possess lower transmissivity, apparently as a result of more complete mineralization.

Results from the tested wells exhibit flow within one or more fractured zones in the underlying bedrock to demonstrate the presence of a fractured flow system. Based on this testing and subsequent investigative phases of the project, average yield and low-yield wells were identified within the GCLF site. The average yield bedrock wells (wells yielding from 5 to 20 gpm) were found to be located within the axis of Gregory Canyon itself (e.g., GMW-1, GMW-4, and GLA-3) within more deeply weathered bedrock, while the low-yield bedrock wells (e.g., wells GLA-1, GLA-2, GLA-4, GLA-A, GLA-D, GLA-E, GLA-F and dry well GLA-9) with recovery rates less than 5 gpm, and typically less than 1 gpm, are located along the western ridgeline, where there is very little weathering and the majority of the fractures have been mineralized.

2.3 AVAILABLE PERCOLATING BEDROCK WATER SUPPLY

The project water resources will be prioritized for the GCLF so that depending on its availability, the on-site percolating bedrock water will be used first for areas designated for biological mitigation, landscape irrigation, and dust control on site haul roads and Borrow/Stockpile areas A and B before imported water resources are used.

There are currently 21 bedrock monitoring wells included in the groundwater monitoring program for the GCLF site. Included in the groundwater monitoring program are 11 bedrock monitoring wells (wells GLA-2, GLA-12, GLA-13, GLA-A through GLA-G, and GMW-1) located on the downgradient (north) side of the landfill in the ancillary facilities area of the site. These proposed monitoring wells are located ideally for downgradient water quality monitoring because groundwater flow is effectively parallel to this boundary and groundwater flowing under the landfill footprint will be brought to the line of these wells. Based on discussions with the Regional Water Quality Control Board (RWQCB), as an additional groundwater system enhancement, each of these downgradient bedrock wells will be equipped with a dedicated pump and plumbed to convey groundwater to an on-site tank. The pump controller for each well will cycle the pump on and off at a rate that matches each well's production capability based on pumping test data. This pumping will capture the groundwater as it flows from beneath the landfill. Figure 3 presents the locations of the water quality detection monitoring program wells.

Pumping tests have been performed in several of the bedrock wells including wells GLA-3, GLA-8, GLA-13, GLA-A, GLA-B, GLA-G, and GMP-2 (GLA, 1997, 2000, 2004). The greatest production was identified within the more deeply weathered bedrock within the center of Gregory Canyon. Wells drilled in unweathered bedrock underlying the northern extension of the western ridgeline (wells west of well GLA-13) recharge very slowly from relatively isolated fractures and have very little production capability. Bedrock wells east of and including well GLA-13 are identified as average yield wells capable of pumping at rates ranging from about 1 gpm to up to 17 gpm.

Further analysis of the pumping test data for well GLA-3, likely one of the most productive wells within Gregory Canyon, was performed to evaluate the long-term sustainable yield in this well. The analysis included review of the well GLA-3 aquifer pumping tests conducted in 2000 and 2004 (GLA, 2001, 2004), and a computer simulation of the well's behavior during continuous pumping at three different rates over various durations. Using the Rockware98 software package's Drawdown Calculator (RockWare Inc. 1998), and the well's aquifer properties, the drawdown was calculated for continuous pumping from this well at a rate of 10, 15 and 20 gpm after periods of 2, 20, 200 and 2000 days. The results of this analysis indicated that pumping rates greater than 15 gpm would draw groundwater down below approximately 53 feet (near the base of the effective aquifer) after 2000 days ($\pm$ 5.5 years). The resulting analysis indicates that although greater pumping rates can be achieved from well GLA-3, the long-term sustainable yield in GLA-3 is approximately 12 gpm or 17,280 gpd (Appendix A).

If the average yield wells are pumped at the toe of the landfill, as is proposed, including wells GLA-B, GLA-C, GLA-G and GLA-12 (estimated to pump 1 to 2 gpm per well), and GLA-13 and GMW-1 (estimated to pump about 4 gpm and 10 gpm, respectively), in addition to well GLA-3 to capture the groundwater as it flows from beneath the landfill, and to provide a water supply, these wells can be reasonable expected to provide approximately 30 gpm (43,200 gpd), sufficient water to support daily operations (e.g., landscape irrigation, dust control and fire protection estimated at 1 to 40,000 gpd).

The bedrock pumping test-derived aquifer properties and the Gregory Canyon catch basin area were used to assess a safe yield for pumping within Gregory Canyon (Appendix A). The safe yield can be defined as the rate at which water can be withdrawn from an aquifer without depleting the supply to such an extent that withdrawal at this rate is harmful to the aquifer itself, or to the quality of the water. Therefore, the safe yield calculation was performed to assess a reasonable level of pumping that did not exceed the amount of groundwater flowing in, and surface water infiltration into the bedrock within the Gregory Canyon catch basin area. The study evaluated the currently proposed landfill configuration in which bedrock will be excavated no more than five feet above the highest anticipated groundwater elevation, rather than the originally proposed landfill configuration as presented in the GCLF 2003 Draft EIR, which would have excavated a portion of the weathered bedrock to depths that are below the piezometric surface. In addition, the safe yield calculation takes into account the entire approximately 415-acre Gregory Canyon catch basin area (i.e., ridgeline to ridgeline and top to bottom of the canyon), not just that portion of the landfill that was to be excavated below the piezometric surface evaluated previously. Since there are no rain gauges in the vicinity of the landfill to provide the historical precipitation data for Gregory Canyon, precipitation data from Lake Henshaw, which averages 25 inches per year, and a 5% infiltration and aquifer recharge rate, were used. Lake Henshaw was selected because, of rain gauge data available in the vicinity of the project location, it provides well documented precipitation data over 42 years. The calculation yields a cumulative pumping rate from the bedrock wells that should not exceed 27 gpm (38,880 gpd). This safe yield value is slightly more conservative than was estimated from the pumping and production data obtained from individual wells including in the proposed pumping program at the toe of the landfill. Recognizing that the actual infiltration rate or average precipitation may be lower, further monitoring of water levels will be conducted to continue to evaluate the effects of the pumping program on the bedrock fracture flow system with pumping reduced, as appropriate to maintain a safe yield within Gregory Canyon.

At the GCLF site, water quality within the bedrock fracture flow system has been evaluated over a number of years. GLA performed an initial limited water quality evaluation in August 1999, and subsequently obtained four quarters of water quality data between December 2000 and December 2001. More recently, beginning in December 2004, water quality samples are being collected to provide a statistically representative database of the water quality data in proposed detection monitoring wells at GCLF site. Bedrock wells within the water quality monitoring program include wells GMW-1, GLA-2 and its replacement well GLA-2R (GLA-2/2R), GLA-3, GLA-4, GLA-5, GLA-11, GLA-12, GLA-13, GLA-14, and GLA-A through GLA-G. The number of samples collected from each well is based on the age of the well and when it was incorporated into the groundwater monitoring program.

None of the water quality data collected to date suggests the presence of measurable organic compounds (i.e., volatile organic compounds, pesticides, and herbicides) in wells at the GCLF site. As presented on Tables 1 through 15, for the bedrock wells the inorganic water quality data including chloride, nitrate, sulfate and TDS indicates that there are two populations of water quality data for each of these constituents, with generally higher concentrations of samples from wells located in the "saddle" area in the northern portion of the western ridgeline and at the top of the canyon (well GLA-5).

Chloride concentrations in the bedrock wells range from about 50 mg/L (in samples from well GLA-4) to as much as 1300 mg/L (in samples from well GLA-D) with an average chloride concentration of about 250 mg/L. Samples with chloride concentrations that consistently exceed the State secondary MCL of 250 mg/L occur in northerly western ridgeline "saddle" wells GLA-2/2R, GLA-D, GLA-E, and GLA-F. Sulfate concentrations range from about 40 mg/L (in well GLA-4) to 350 mg/L (in well GLA-5), with only the sulfate concentrations in well GLA-5 exceeding the state secondary MCL of 250 mg/L in GCLF site bedrock wells. The average nitrate as nitrogen concentration in bedrock wells is 15 mg/L, with concentrations that are less than 1 mg/L in samples from wells GLA-B, GLA-G, GLA-11 and GLA-12 on the northeast side of the GCLF. However, the State primary MCL (10 mg/L) is exceeded in samples from northerly western ridgeline saddle wells GLA-A, GLA-D, GLA-E, GLA-F, GLA-2/2R, GLA-13 and GLA-14, and in well GLA-5 located at the top of the canyon, with the highest values measured in samples from well GLA-2/2R. Finally, TDS concentrations range from slightly less than 500 mg/L (in samples from well GLA-4) to over 2500 mg/L (in samples from well GLA-D), and average 945 mg/L. Water quality results that exceed the State upper MCL for TDS of 1000 mg/L were measured in samples from the northern western ridgeline saddle wells GLA-D, GLA-E, GLA-F, and GLA-2/2R, and in well GLA-5 at the top of the canyon compared with the rest of the sampled wells on the site.

The fact that many of the highest inorganic constituent concentrations occur in the well GLA-5 at the top of the canyon and in wells located within bedrock that includes very few fractures and very low production suggests that because of the paucity of fractures and very little groundwater movement through the zone, the groundwater has time to accumulates minerals from within the available fractures, or general chemistry constituents such as nitrate from area fertilizers (especially in well GLA-5 located adjacent to agricultural areas). Wells in more weathered bedrock experience significantly more groundwater flow and as a result have very little residence time within the fractures for accumulation and exchange of minerals from the bedrock. Considerable dilution would also be expected from water flowing from Gregory Canyon recharge areas.

2.4 POTENTIAL IMPACTS ASSOCIATED WITH USE OF PERCOLATING GROUNDWATER

Potential impacts associated with the proposed water supply program may include the following:

- Reduced daily volumes of bedrock (percolating) groundwater for project water supply needs.

A safe yield of 27 gpm (38,880 gpd) was calculated for the bedrock fracture flow system within the entire Gregory Canyon catch basin area. The safe yield is exceeded if the amount of water that is pumped from the bedrock exceeds that amount of water that enters the bedrock system through infiltration. Each of the wells located along the downgradient point of compliance will be equipped with a dedicated pumping system and controller to convey water to an on-site water supply tank. Using the controller, each pump will cycle on and off at a rate that matches the wells production capabilities, and maintain the safe yield for the Gregory Canyon catch basin area.

Over the course of the project, the well production may decline, as might occur under a long-term drought condition. In response to reduced availability of percolating water from the bedrock well system for daily operational water uses, additional recycled water will be used to supplement the percolating water and meet the project water supply needs, primarily within the landfill footprint. As much as possible, the available percolating water will be prioritized and applied to areas of the site that are outside of the landfill footprint, before imported recycled water. With the proposed use of wells with dedicated pumping systems to manage the volumes of water pumped from the bedrock and regular assessment of the safe yield for Gregory Canyon, impacts from the pumping of the bedrock groundwater for water supply purposes would be avoided.

3.0 OFF-SITE HIGHLY-TREATED RECYCLED WATER

It is recognized that the on-site bedrock (percolating) water sources are insufficient to fully support both landfill operations and construction activities at the GCLF. Disinfected tertiary-treated recycled water, supplied by the Olivenhain Municipal Water District (OMWD), has been identified as a reasonable off-site water source for project uses, as opposed to drinking water sources. In recent years, this type of water is commonly being used for domestic, agricultural, commercial and industrial uses where drinking water quality is not required. OMWD currently operates a 2 million gallon per day treatment plant that converts wastewater to recycled water, and a 3 million gallon recycled water blending reservoir.

The off-site water is highly treated for unrestricted uses other than drinking water to meet or exceed the requirements established in Title 22, Division 4, Chapter 3, of the California Code of Regulations (CCR) to ensure proper health protection and specify the treatment level is consistent with the intended use of the water. Because the water is produced from municipal wastewater, the treatment program is extensive. The OMWD treatment plant processes wastewater through tertiary treatment, followed by proper disinfection, before it is blended with imported water for distribution. This type of treatment program is designed to remove virtually all of the pathogenic organisms that may have originated in the initial waste stream. At the same time, the treatment process is not as extensive as that required for potable water and therefore it is not safe for drinking, inadvertent inhalation as might occur from overspray applications, or ingesting from skin contact.

The San Diego County Department of Environmental Health (DEH) and the RWQCB are the primary agencies responsible for regulating the treatment and use of recycled water on specific projects. The DEH provides plan check and inspection services and the RWQCB issues the waste discharge permits for the production and distribution of recycled water. Discussions with both of these agencies indicate that the proposed project application of recycled water for dust control and construction operations are compatible uses. A waiver must be issued by the RWQCB to the OMWD for the application of their recycled water to the project area in the Pala Hydrologic Subarea, followed by a revision to OMWD's Master Reclamation Permit.

For the GCLF project, recycled water will be trucked by 2300 gallon water trucks from an OMWD Santa Fe Valley Reservoir and Pump Station site located near the intersection of Artesian Road and Marantha Way. The trucks will travel on Marantha Way to Camino Del Norte Road to access Interstate 15 and deliver the recycled water to a tank located in the landfill ancillary facilities area. As shown on Figure 5, the recycled water will be gravity-fed from each transport truck to a designated 20,000-gallon capacity storage tank. It is proposed that on-site recycled water applications will be limited to water trucks; there will be no irrigation piping or hose bibs that would provide an opportunity for inadvertent cross-connections or human consumption at the site.

During operations and construction, recycled water will be applied by water trucks as needed throughout the day. Generally, for dust control unpaved roads will be wetted down as needed during construction. Recycled water applications for clay liner processing will occur in place or adjacent to cell construction within the landfill footprint, as it is needed during the construction process. All of the water applications will be conducted by the water truck driving the site area or road to release a relatively consistent stream of water to dampen the area/clay material. With the exception of some localized landscape irrigation applications, stationary applications that might create ponding will not be allowed. Runoff will be avoided at all times.

On-site precautions are necessary to protect project employees from health and safety concerns associated with the use of recycled water on the project site. This includes the following:

- ❑ Designation of a Recycled Water Site Supervisor trained in the use of recycled water and capable of giving regular and continuous training and oversight to site personnel on its uses,
- ❑ Readily available potable water for drinking and hand washing on the site,
- ❑ Use of signage on all on-site water trucks and drop tanks with "Recycled Water – Do Not Drink" and purple paint or wrapping on distribution points, and

- Disinfection of all water trucks and tanks prior to reuse with other than recycled water.

In addition, best management practices will be implemented to protect the environment from ponding and inadvertent runoff including secondary containment around the storage tanks capable of holding the tank volume.

Under a worst case scenario, Gregory Canyon Ltd. has contracted to obtain sufficient water for all of the project's water needs for the life of the project, including daily operational water.

3.1 POTENTIAL IMPACTS ASSOCIATED WITH HIGHLY-TREATED RECYCLED WATER

Potential impacts associated with the proposed water supply program may include the following:

- Potential degradation of groundwater quality from the application of recycled water, and
- Potential public health and safety impacts associated with the use of recycled water.

Each of these potential impacts is described in the following sections.

3.1.1 Potential Degradation of Groundwater Quality

Recognizing that recycled water is widely used for dust control, grading projects and irrigation, the use of highly-treated recycled water for the GCLF project introduces water with a different water quality that could affect the existing water quality conditions at the GCLF site. Currently the San Diego Basin Plan (1994) has established municipal and domestic supply, agricultural supply and industrial process supply as existing beneficial uses of groundwater in the Pala Hydrologic Subarea. Water that is designated for use as domestic or municipal supply may not exceed the MCLs established by the State. The Basin Plan further states that for recycled water that is discharged, it should not exceed the Basin Plan water quality objectives (WQOs), which are established by the RWQCB for the protection of the water for beneficial uses. The OMWD is required to conduct continuous, monthly, quarterly and annual monitoring of its effluent to ensure proper treatment is being conducted from the treatment plant. A comparison of the Basin Plan groundwater quality objectives for the Pala Hydrologic Subarea (RWQCB, 1994) and 12-month (2005) average recycled water quality data from the OMWD plant calculated from the fourth quarter 2005 monitoring period are provided in the following table, along with average constituent concentrations measured to date from the bedrock groundwater monitoring wells on the GCLF site:

Analyte	Pala Basin WQOs (RWQCB, 1995)	Receiving Bedrock Groundwater (average value from on-site well data)	OMWD Recycled Water Quality Data (12-month average – 4th quarter 2005)
TDS	900 mg/L	945 mg/L	917 mg/L
Sulfate	500 mg/L	107 mg/L	214.75 mg/L
% Sodium	60%	NA	63.42%*
Manganese	0.05 mg/L	NA	0.01 mg/L
Boron	0.75 mg/L	NA	0.10 mg/L
Turbidity	5 NTU	NA	<2 NTU
Fluoride	1.0 mg/L	NA	0.3 mg/L
Chloride	300 mg/L	246 mg/L	259 mg/L
Nitrate – N	15 mg/L	15 mg/L	NA
Iron	0.3 mg/L	NA	Non-Detect last 8 quarters
MBAS	0.5 mg/L	NA	Non-Detect last 8 quarters
Odor	None	NA	NA (None)
Color	15 units	NA	9.6

Note: MBAS – Methyl Blue-Activated Substances (tests the presence of detergent in the water.
NTU – Nephelometric Turbidity Unit.
NA – Not Analyzed.
* The yearly, rolling average % Sodium was exceeded during this quarter.

In addition to the above constituents, the recycled water effluent metals monitoring results indicated no measurable concentrations of aluminum, chromium, copper, manganese, nickel, lead, zinc, cadmium, silver, arsenic, mercury or selenium. Of the metals monitored in the effluent, only a concentration of 0.04 mg/L of barium was measured, well below the state MCL of 1.0 mg/L. OMWD also reports that in the past year, although not currently included in the required list of routine monitoring parameters for the treatment plant, analyses were performed for a broader suite of analytes, which may be present in the incoming wastewater. The results of these tests indicated that most of these analytes were not detected in the effluent samples. OMWD reports that no pharmaceutical manufacturing facilities exist within the District. Therefore, the presence of pharmaceuticals in recycled water is highly unlikely.

Review of this recycled water quality data indicates that with the exception of the slightly elevated values for percent sodium and TDS measured during the past year, the recycled water quality is compatible with the Pala Basin WQOs. It should be noted however, that the measured TDS values in bedrock groundwater monitoring wells across the GCLF site contain an average TDS concentration (945 mg/L) that is greater than the Basin WQO of 900 mg/L and the TDS concentration measured in the recycled water. OMWD has indicated that the measured values are for the effluent water coming out of the treatment plant and the value may be lower when the treated water is blended, although blending is only performed as necessary to meet the recycled water demands of its customers.

In addition, it is recognized that the recycled water will contain higher concentrations of some constituents compared with the existing alluvial and bedrock water quality data measured in representative wells at the GCLF site. However, if it is assumed that a maximum of 193 acre-feet per year (AFY) of recycled water is applied to the site during construction and operations at a rate of 750 gallons per acre per application, and using a conservative evaporation rate of 45 inches for San Diego County, it is calculated that a minimum of 30 percent of the water (58 AFY) would evaporate. Using an average of 25 inches of rainfall for the area, an estimated 865 AFY of rainwater would fall on the project site; more than six times the volume of remaining applied recycled water, and providing significant dilution to the recycled water so that it is unlikely that the recycled water would have a negative effect on the underlying groundwater. It should be noted that this is a conservative estimate since a significant quantity of the total volume of recycled water applied during landfill construction and operations would be applied within the landfill footprint and captured by the liner containment systems.

The highest risk to the surrounding groundwater (and surface water) might be expected by a significant release and resulting runoff of recycled water from one of the on-site recycled water storage tanks. To prevent this from occurring, the on-site recycled water storage tank facility will include construction and maintenance of secondary containment capable of holding the entire tank volume. The containment system will consist of an impervious material that will also prevent downward migration of the recycled water if it is released into the containment structure. It is proposed that all of the project's water needs may be met with the use of imported highly-treated water. The principle recycled water applications and proposed project practices are described below.

Daily Waste and Cover Soil Compaction/Dust Control Water. Recycled water may be applied to the haul roads, work areas within the landfill, and the borrow/stockpile areas as part of daily operations and construction activities for dust suppression or to assist in compacting the waste or the overlying daily cover soils. The process typically will include driving a water truck on the road or area that is to receive the recycled water for compaction or dust suppression. As the truck is driven, enough water is released to dampen the surface without creating significant ponding. Most of the applied water is surficial and will evaporate rather than percolate down into the underlying soil. As a result, these water applications may be conducted frequently, especially on hot days when evaporation is greatest. Though not expected, water migrating downward from areas within the landfill footprint that receive recycled water will be captured by the leachate collection and removal system (LCRS) for collection at the base of the landfill in one of the two LCRS tanks. Best management practices will be employed to limit runoff outside of the area to be sprayed for dust control or compaction and prevent ponding of water during water applications to reduce the impacts of recycled water on the underlying groundwater.

Landscape Irrigation Water. Although it is proposed that percolating water will be used for landscape irrigation, some areas of the site may receive recycled water if the percolating water supply is limited. As with dust control, the water truck will be used to spray the area to receive the irrigation water. No hard plumbed irrigation systems are proposed for recycled water use. For irrigation purposes, the planted material may be encircled by a collection basin to better capture the water for uptake by the plant's root system. However, the majority of the applied water will either be taken up by the plant or evaporate. Very little of the water would be expected to migrate downward to the underlying groundwater flow system. Best management practices will be employed during the recycled water application to plants to limit runoff outside of the area to be irrigated.

Construction Water. Water use during construction will include dust control (described above) and processing water for the low-permeability soil (clay) liner and protective cover soil. Prior to the placement of the low-permeability soil layer or the uppermost protective cover soil, the base of the composite liner system includes the placement of a 12-inch thick subdrain gravel layer with a series of drainage pipes connected to a downgradient tank that will collect groundwater that intersects the landfill excavation area. On top of the subdrain layer, after a 12-ounce geotextile is placed over the gravel subdrain layer, a 24-inch thick low-permeability soil layer will be constructed. Low-permeability soil placement will be conducted in a series of six to eight-inch lifts, under the direction of a construction quality assurance (CQA) monitor. Prior to compaction, the low-permeability soil will be blended and moisture conditioned. The moisture conditioning process will include the addition of recycled water at a level that allows the clay to absorb the liquid into its matrix and become uniform and homogeneous. Addition of excessive water resulting in potential runoff is neither appropriate, nor acceptable during material processing as it will not produce the necessary soil product for placement and compaction. The processing area will be within the landfill footprint area, either for in-place compaction or adjacent to cell construction and will include containment to prevent excess water from leaving the area. Downward migration into the underlying bedrock is expected to be very low associated with the material processing, since by the nature of the clay, the water is not likely to be released readily from it, and because the excess water would be captured by the subdrain.

Once the 24-inch thick low-permeability soil layer is constructed, based on the performance characteristics of the low-permeability soil product required for liner construction, the water will bind within its matrix. It is anticipated that only a very low volume of construction water is likely to be released from the clay following its construction and this would be captured by the subdrain. Similarly, during placement of the protective cover soil and subsequent daily cover soils over landfill waste cells, recycled water will be added to assist in soil compaction. The excess water, if any, would flow downward to the LCRS for collection and conveyed to the LCRS tanks. Therefore, with the use of best management practices of avoiding ponding and runoff during the material processing and placement construction operations, impacts to groundwater are expected to be very low from the application of recycled water.

3.1.2 Potential Personnel Health and Safety Impacts Associated with the Recycled Water

The facility is isolated from the general population, and not readily accessible to the public at large. As a result, exposures to the recycled water from the water truck delivery and distribution programs are generally limited to areas outside of public access. Therefore, the risk to the public is negligible. However, the use of recycled water for project non-potable water supply purposes, though highly treated and disinfected, may pose the potential for site personnel contact that may be a significant impact to their health. The greatest potential risks to personnel health are related to direct contact with the water and inadvertent ingestion and inhalation of the overspray. In addition, the tanks and water trucks that receive the recycled water must be carefully managed and maintained to assure that the recycled water delivered by the water purveyor is of the same quality (i.e., has not been degraded) while it is stored on site. The best way to assure the health and safety of the site personnel is with the designation of a Recycled Water Site Supervisor who is responsible for the on-site recycled water system and for all involved personnel on the site. This Supervisor will have the following duties and responsibilities:

- ❑ Have attended a State or County DEH-approved training class on the use of recycled water to be fully informed as what recycled water is and how it is produced.
- ❑ Responsible for proper installation, operation and maintenance of the on-site recycled water tanks and water trucks and appurtenances, including flushing and disinfection of water trucks and tanks prior to reuse with other than recycled water.
- ❑ Keep the water purveyor informed of any failures, emergencies and proposed changes that occur involving the recycled water system and maintain a current copy of the recycled water agreement on site.
- ❑ Provide continuous and regular training to on-site personnel on the presence and proper use of recycled water, including protocols such as washing of hands and areas that become in contact with recycled water, and avoiding overspray from the water trucks to protect their health and safety.
- ❑ Ensure compliance with all rules, regulations and best management practices for the use of recycled water on the site. Included in the implementation of best management practices is instruction of on-site staff about avoiding ponding, overland runoff, and releases of recycled water other than required in support of the project.
- ❑ Act as a 24-hour contact and liaison with the recycled water purveyor to ensure the safe and efficient use of recycled water at the site.
- ❑ Proper posting of recycled water tanks and trucks with "RECYCLED WATER – DO NOT DRINK" in large readable (English/Spanish) print, and distribution piping colored purple or wrapped with purple tape.

With a well informed Recycled Water Site Supervisor and site personnel, the health and safety risks associated with the use of recycled water are expected to be low.

4.0 CUMULATIVE IMPACTS

A discussion of potential cumulative impact on public services and utilities, including water service and facilities, was contained in Section 5.2.14 of the 2003 Draft EIR.

A reanalysis of potential impacts has been undertaken, considering the nature and location of current proposed individual cumulative projects, which were identified in the traffic report prepared by Darnell & Associates and contained in Appendix A to the Revised Final EIR.

The project will rely primarily on the use of recycled water to meet its projected needs. The use of recycled water would have no impact on water service and facilities, as those relate to potable water.

The only potentially potable water that would be used for the project is percolating bedrock groundwater pumped from areas outside of the Pala Basin. Section 2.3 of this report contains a safe yield calculation. The calculation yields a cumulative pumping rate from the bedrock wells that should not exceed 27 gpm (38,880 gpd). Pumping at this level is sustainable, and will not cause any cumulative impacts to water service and facilities.

In addition, the location of current individual cumulative projects in the area around the proposed project has been reviewed. None of those are in the near vicinity of Gregory Canyon. As a result there are no other projects that might use this same percolating bedrock groundwater as overlying users, such that the safe yield calculation above would be altered.

5.0 CLOSURE

This report is based on the data presented above and described herein. GeoLogic Associates should be notified of any conditions that differ from those described herein since this may require reevaluation of the data and conclusions provided above. This report has not been prepared for use by other parties or projects other than those described above. It may not contain sufficient information for other parties or purposes.

This report has been prepared in accordance with generally accepted geologic and hydrogeologic practices, and makes no warranties, either expressed or implied, as to the professional content and data presented herein.

Based upon the data provided in this report, and incorporation of the project features notes, the project will not have any significant project-related or cumulative impacts on water supply resources requiring mitigation.

GeoLogic Associates

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6.0 REFERENCES

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TABLES

TABLE 1
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-2/GLA-2R

ANALYTE	UNITS	Aug 1999	Dec 2000	Mar 2001	Jun 2001	Sep 2001	Dec 2004	Apr 2005
GENERAL CHEMISTRY								
Chloride	mg/L	164	369	450	529	600	828	790
Cyanide	mg/L	NA	0.0063	0.0063	0.0063	0.0006	NA	NA
Nitrate as N	mg/L	26.2	41.8	42.9	42.9	43	47.6	31
pH	units	7.10	7.39	7.37	7.34	7.9	7.4	7.2
Sulfate	mg/L	136	160	150	160	190	200	150
Sulfide	mg/L	NA	0.050	0.050	0.050	0.1	NA	NA
Total Dissolved Solids (TDS)	mg/L	888	1400	1410	1620	1940	2470	2200
METALS								
Antimony	mg/L	NA	**0.010**	0.008	0.008	0.00012	NA	NA
Arsenic	mg/L	NA	**0.001**	0.0007	0.0007	**0.0019**	NA	NA
Barium	mg/L	NA	**0.053**	0.0009	0.066	**0.066**	NA	NA
Beryllium	mg/L	NA	0.00032	0.00032	0.00032	0.00042	NA	NA
Cadmium	mg/L	NA	0.004	0.004	0.004	**0.00031**	NA	NA
Calcium	mg/L	NA	120	160	170	180	270	240
Chromium	mg/L	NA	0.004	0.004	0.004	**0.0031**	NA	NA
Cobalt	mg/L	NA	0.002	0.002	0.002	**0.00085**	NA	NA
Copper	mg/L	NA	**0.005**	0.003	0.003	**0.0061**	NA	NA
Lead	mg/L	NA	**0.0004**	**0.0005**	0.004	0.000098	NA	NA
Magnesium	mg/L	NA	71	92	100	96	130	120
Mercury	mg/L	NA	0.00010	0.00010	**0.00013**	0.00043	NA	NA
Nickel	mg/L	NA	0.003	0.003	0.003	**0.0066**	NA	NA
Selenium	mg/L	NA	0.003	**0.001**	0.0006	0.012	NA	NA
Silver	mg/L	NA	**0.004**	0.003	**0.003**	**0.0018**	NA	NA
Sodium	mg/L	NA	200	240	230	240	240	190
Thallium	mg/L	NA	0.020	0.0007	0.0007	0.000063	NA	NA
Tin	mg/L	NA	NA	0.006	0.002	0.000083	NA	NA
Vanadium	mg/L	NA	0.040	0.050	0.040	0.041	NA	NA
Zinc	mg/L	NA	0.0085	0.011	**0.0057**	0.022	NA	NA
VOLATILE ORGANIC COMPOUNDS								
Acetone	µg/L	**4.3**[a]	0.5	5.935	5.935	4.2	3.9	6.1
p+m-Xylenes	µg/L	**0.69**	0.5	NA	NA	0.30	NA	0.26
Toluene	µg/L	**0.52**	0.5	0.047	0.047	0.22	0.12	0.15
Trichlorofluoromethane	µg/L	0.35	0.5	0.13	0.044	0.23	0.094	0.19
SEMI-VOLATILE ORGANIC COMPOUNDS								
bis(2-Ethylhexyl) Phthalate	µg/L	NA	**1.8**[a]	0.33	NA	2.0	NA	NA
Butylbenzyl Phthalate	µg/L	NA	**0.28**[a]	0.24	NA	2.1	NA	NA
HERBICIDES, PESTICIDES, & PCBs (µg/L): None Detected								

NOTES:

NA = Not Analyzed/Not Applicable

(shaded) Indicates that the analyte was not detected above laboratory practical quantitation limit. Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

[a] Suspected laboratory/field contaminant.

TABLE 1 (CONT'D)
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-2/GLA-2R

ANALYTE	UNITS	Aug 2005	Nov 2005	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY								
Chloride	mg/L	630	480	529	538	206	164	828
Cyanide	mg/L	NA	NA	NC	NC	NC	NC	NC
Nitrate as N	mg/L	34	33	41.8	38	7.1	26.2	47.6
pH	units	7.0	7.4	7.37	7.34	0.25	7.0	7.9
Sulfate	mg/L	180	160	160	165	21	136	200
Sulfide	mg/L	NA	NA	NC	NC	NC	NC	NC
Total Dissolved Solids (TDS)	mg/L	1900	1700	1700	1725	471	888	2470
METALS								
Antimony	mg/L	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/L	NA	NA	NC	NC	NC	NC	NC
Barium	mg/L	NA	NA	0.07	0.06	0.01	0.053	0.066
Beryllium	mg/L	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/L	NA	NA	NC	NC	NC	NC	NC
Calcium	mg/L	200	190	185	191	47	120	270
Chromium	mg/L	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/L	NA	NA	NC	NC	NC	NC	NC
Copper	mg/L	NA	NA	NC	NC	NC	NC	NC
Lead	mg/L	NA	NA	NC	NC	NC	NC	NC
Magnesium	mg/L	100	91	98	100	18	71	130
Mercury	mg/L	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/L	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/L	NA	NA	0.003	0.005	0.006	0.001	0.012
Silver	mg/L	NA	NA	0.003	0.0029	0.0011	0.0018	0.004
Sodium	mg/L	210	190	220	218	23	190	240
Thallium	mg/L	NA	NA	NC	NC	NC	NC	NC
Tin	mg/L	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/L	NA	NA	0.041	0.043	0.005	0.040	0.050
Zinc	mg/L	NA	NA	0.0098	0.0118	0.0071	0.0057	0.022
VOLATILE ORGANIC COMPOUNDS								
Acetone	µg/L	6.2	6.2	NC	NC	NC	NC	NC
p+m-Xylenes	µg/L	0.26	0.26	NC	NC	NC	NC	NC
Toluene	µg/L	0.15	0.15	NC	NC	NC	NC	NC
Trichlorofluoromethane	µg/L	0.20	0.20	NC	NC	NC	NC	NC
SEMI-VOLATILE ORGANIC COMPOUNDS								
bis(2-Ethylhexyl) Phthalate	µg/L	NA	NA	NC	NC	NC	NC	NC
Butylbenzyl Phthalate	µg/L	NA	NA	NC	NC	NC	NC	NC
HERBICIDES, PESTICIDES, & PCBs (µg/L): None Detected								

NOTES:

NA = Not Analyzed/Not Applicable

Indicates that the analyte was not detected above laboratory practical quantitation limit. Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

NC No calculation performed. Requires a minimum of three data entries.

TABLE 2
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-4

ANALYTE	UNITS	Aug 1999	Dec 2000	Mar 2001	Jun 2001	Sep 2001	Dec 2004	Apr 2005
GENERAL CHEMISTRY								
Chloride	mg/L	46	68	75	78	78	76	79
Cyanide	mg/L	NA	0.0063	0.0063	0.0063	0.0006	NA	NA
Nitrate as N	mg/L	1.0	1.61	1.50	1.48	1.6	1.18	1.2
pH	units	6.42	7.21	7.22	7.03	7.1	6.8	6.8
Sulfate	mg/L	30	39	38	35	42	38	39
Sulfide	mg/L	NA	0.050	0.050	0.050	0.1	NA	NA
Total Dissolved Solids (TDS)	mg/L	444	477	453	490	480	553	530
METALS								
Antimony	mg/L	NA	**0.020**	0.008	0.008	**0.00013**	NA	NA
Arsenic	mg/L	NA	0.0007	**0.0009**	0.0007	**0.0012**	NA	NA
Barium	mg/L	NA	**0.030**	0.0009	0.030	**0.028**	NA	NA
Beryllium	mg/L	NA	0.00032	0.00032	0.00032	0.00042	NA	NA
Cadmium	mg/L	NA	0.0004	0.004	0.004	**0.00020**	NA	NA
Calcium	mg/L	NA	58	72	72	71	96	85
Chromium	mg/L	NA	0.0004	0.004	0.004	**0.0071**	NA	NA
Cobalt	mg/L	NA	0.002	0.002	0.002	**0.00044**	NA	NA
Copper	mg/L	NA	**0.008**	0.003	**0.004**	**0.0055**	NA	NA
Lead	mg/L	NA	**0.0004**	0.0004	0.0004	**0.00019**	NA	NA
Magnesium	mg/L	NA	21	23	22	20	24	22
Mercury	mg/L	NA	0.00010	0.00010	0.00010	0.00043	NA	NA
Nickel	mg/L	NA	0.003	0.003	0.020	**0.0047**	NA	NA
Selenium	mg/L	NA	0.0006	**0.0006**	0.0006	**0.0022**	NA	NA
Silver	mg/L	NA	**0.004**	0.003	0.003	0.000098	NA	NA
Sodium	mg/L	NA	68	79	74	77	82	78
Thallium	mg/L	NA	0.020	0.0007	0.0007	0.000063	NA	NA
Tin	mg/L	NA	NA	0.006	0.002	0.000083	NA	NA
Vanadium	mg/L	NA	0.010	0.003	**0.007**	**0.0066**	NA	NA
Zinc	mg/L	NA	**0.032**	0.460	0.450	1.200	NA	NA
VOLATILE ORGANIC COMPOUNDS								
1,2,4-Trimethylbenzene	µg/L	0.21	0.5	0.078	0.52	NA	0.16	0.15
1,3,5-Trimethylbenzene	µg/L	0.24	0.5	0.066	**0.21**	NA	0.13	0.13
Benzene	µg/L	0.25	0.5	0.044	**0.11**	0.18	0.13	0.12
Ethylbenzene	µg/L	0.17	0.5	0.057	**0.41**	0.18	0.14	0.14
n-Propylbenzene	µg/L	0.25	0.5	0.053	**0.12**	NA	0.11	0.12
Naphthalene	µg/L	0.57	0.5	0.094	**0.26**	0.42	0.12	0.12
tert-Butylbenzene	µg/L	0.16	0.5	0.066	**0.08**	NA	NA	NA
Toluene	µg/L	0.11	0.5	0.047	1.4[a]	0.22	0.12	0.15
Xylenes (Total)	µg/L	NA	1.0	0.236	2.7	NA	0.40	0.40
SEMI-VOLATILE ORGANIC COMPOUNDS								
Benzoic Acid	µg/L	NA	0.86	0.86	**2.6**	NA	NA	NA
bis(2-Ethylhexyl) Phthalate	µg/L	NA	**2.4[a]**	0.34	**1.1[a]**	2.0	NA	NA
Butylbenzyl Phthalate	µg/L	NA	0.25	0.25	**0.44[a]**	2.1	NA	NA
Di-n-butyl Phthalate	µg/L	NA	0.25	0.25	**0.36[a]**	2.6	NA	NA
Naphthalene	µg/L	NA	0.25	0.25	**0.29[a]**	3.5	NA	NA
HERBICIDES, PESTICIDES, & PCBs (µg/L): None Detected								

NOTES:

NA = Not Analyzed/Not Applicable

Indicates that the analyte was not detected above laboratory practical quantitation limit.
Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

[a] Suspected laboratory/field contaminant.

TABLE 2 (CONT'D)
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-4

ANALYTE	UNITS	Aug 2005	Nov 2005	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY								
Chloride	mg/L	75	77	76	72	10	46	79
Cyanide	mg/L	NA	NA	NC	NC	NC	NC	NC
Nitrate as N	mg/L	1.7	1.6	1.5	1.4	0.24	1.0	1.7
pH	units	7.1	6.9	7.03	6.95	0.26	6.42	7.22
Sulfate	mg/L	42	41	39	38	4	30	42
Sulfide	mg/L	NA	NA	NC	NC	NC	NC	NC
Total Dissolved Solids (TDS)	mg/L	490	510	490	492	35	444	553
METALS								
Antimony	mg/L	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/L	NA	NA	NC	NC	NC	NC	NC
Barium	mg/L	NA	NA	0.030	0.029	0.001	0.028	0.030
Beryllium	mg/L	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/L	NA	NA	NC	NC	NC	NC	NC
Calcium	mg/L	60	71	72	73	12	58	96
Chromium	mg/L	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/L	NA	NA	NC	NC	NC	NC	NC
Copper	mg/L	NA	NA	0.0055	0.0058	0.002	0.004	0.008
Lead	mg/L	NA	NA	NC	NC	NC	NC	NC
Magnesium	mg/L	24	23	23	22	1	20	24
Mercury	mg/L	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/L	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/L	NA	NA	NC	NC	NC	NC	NC
Silver	mg/L	NA	NA	NC	NC	NC	NC	NC
Sodium	mg/L	80	80	79	77	4	68	82
Thallium	mg/L	NA	NA	NC	NC	NC	NC	NC
Tin	mg/L	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/L	NA	NA	0.007	0.0079	0.0019	0.0066	0.010
Zinc	mg/L	NA	NA	0.455	0.536	0.486	0.032	1.200
VOLATILE ORGANIC COMPOUNDS								
1,2,4-Trimethylbenzene	µg/L	0.11	**0.20**	NC	NC	NC	NC	NC
1,3,5-Trimethylbenzene	µg/L	0.11	0.11	NC	NC	NC	NC	NC
Benzene	µg/L	0.12	0.12	NC	NC	NC	NC	NC
Ethylbenzene	µg/L	0.13	0.13	NC	NC	NC	NC	NC
n-Propylbenzene	µg/L	0.13	0.13	NC	NC	NC	NC	NC
Naphthalene	µg/L	0.098	0.098	NC	NC	NC	NC	NC
tert-Butylbenzene	µg/L	0.12	0.12	NC	NC	NC	NC	NC
Toluene	µg/L	0.15	0.86[b]	NC	NC	NC	NC	NC
Xylenes (Total)	µg/L	0.40	0.40	NC	NC	NC	NC	NC
SEMI-VOLATILE ORGANIC COMPOUNDS								
Benzoic Acid	µg/L	NA	NA	NC	NC	NC	NC	NC
bis(2-Ethylhexyl) Phthalate	µg/L	NA	NA	NC	NC	NC	NC	NC
Butylbenzyl Phthalate	µg/L	NA	NA	NC	NC	NC	NC	NC
Di-n-butyl Phthalate	µg/L	NA	NA	NC	NC	NC	NC	NC
Naphthalene	µg/L	NA	NA	NC	NC	NC	NC	NC
HERBICIDES, PESTICIDES, & PCBs (µg/L): None Detected								

NOTES:
NA = Not Analyzed/Not Applicable
Indicates that the analyte was not detected above laboratory practical quantitation limit.
Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.
NC No calculation performed. Requires a minimum of three data entries.
[b] Also found in blank.

TABLE 3
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-5

ANALYTE	UNITS	Aug 1999	Dec 2000	Mar 2001	Jun 2001	Sep 2001	Sep 2001	Dec 2001	Dec 2001
GENERAL CHEMISTRY									
Chloride	mg/L	157	156	163	NA	150	150	147	150
Cyanide	mg/L	NA	0.0063	0.0063	NA	0.0006	0.0006	0.02	0.02
Nitrate as N	mg/L	16.6	18.6	18.8	NA	21	21	1.94	1.76
pH	units	6.66	7.09	7.28	NA	6.70	6.7	6.3	NA
Sulfate	mg/L	309	313	317	NA	350	350	203	179
Sulfide	mg/L	NA	0.050	0.050	NA	0.1	0.1	0.1	0.1
Total Dissolved Solids (TDS)	mg/L	992	1030	1000	NA	1120	1130	1650	1575
METALS									
Antimony	mg/L	NA	**0.010**	0.008	NA	0.00012	0.00012	0.01	NA
Arsenic	mg/L	NA	0.0007	0.0007	NA	0.00030	0.00030	0.005	NA
Barium	mg/L	NA	0.150	0.180	NA	0.170	0.170	0.005	NA
Beryllium	mg/L	NA	0.00032	0.00032	NA	0.00042	0.00042	0.002	NA
Cadmium	mg/L	NA	0.004	0.004	NA	0.00012	0.00012	0.04	NA
Calcium	mg/L	NA	93	110	NA	110	100	19.1	17.0
Chromium	mg/L	NA	0.004	0.004	NA	**0.0022**	**0.0032**	0.02	NA
Cobalt	mg/L	NA	0.002	0.002	NA	**0.00052**	**0.00051**	NA	NA
Copper	mg/L	NA	0.003	0.003	NA	**0.0022**	**0.0024**	0.005	NA
Lead	mg/L	NA	0.0004	0.0004	NA	**0.00070**	**0.00140**	0.002	NA
Magnesium	mg/L	NA	56	66	NA	58	57	74	68
Mercury	mg/L	NA	0.00010	0.00010	NA	0.00043	0.00043	0.001	NA
Nickel	mg/L	NA	0.003	0.003	NA	**0.0038**	**0.0039**	0.04	NA
Selenium	mg/L	NA	0.0006	**0.0007**	NA	**0.0016**	**0.0017**	0.005	NA
Silver	mg/L	NA	**0.003**	0.003	NA	**0.00013**	**0.00010**	0.005	NA
Sodium	mg/L	NA	100	120	NA	140	130	165	158
Thallium	mg/L	NA	0.020	0.0007	NA	0.00063	0.000063	0.01	NA
Tin	mg/L	NA	NA	0.006	NA	0.00083	0.000083	0.05	NA
Vanadium	mg/L	NA	0.020	0.020	NA	0.038	0.038	0.05	NA
Zinc	mg/L	NA	**0.018**	0.089	NA	0.022	0.028	0.01	NA
VOLATILE ORGANIC COMPOUNDS									
1,2,4-Trimethylbenzene	µg/L	0.21	0.5	0.078	0.078	NA	NA	0.45	NA
Carbon Disulfide	µg/L	0.54	0.5	0.266	0.266	**0.31**[a]	**0.28**[a]	NA	NA
Toluene	µg/L	0.11	0.5	0.047	0.047	0.22	0.22	0.24	NA
SEMI-VOLATILE ORGANIC COMPOUNDS									
bis(2-Ethylhexyl) Phthalate	µg/L	NA	**1.8**[a]	0.34	NA	2.0	2.0	0.83	NA
HERBICIDES, PESTICIDES, & PCBs (µg/L): None Detected									

NOTES:

NA = Not Analyzed/Not Applicable

Indicates that the analyte was not detected above laboratory practical quantitation limit.
Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

[a] Suspected laboratory/field contaminant.

TABLE 3 (CONT'D)
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-5

ANALYTE	UNITS	Dec 2004	Apr 2005	Aug 2005	Nov 2005	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY										
Chloride	mg/L	140	NA	140	140	150	149	8	140	163
Cyanide	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Nitrate as N	mg/L	29.2	NA	20	22	19.4	17.1	8.7	1.76	29.2
pH	units	6.8	NA	7.5	7.3	6.8	6.93	0.39	6.3	7.5
Sulfate	mg/L	343	NA	270	280	311	291	60	179	350
Sulfide	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Total Dissolved Solids (TDS)	mg/L	1140	NA	980	1000	1075	1162	246	980	1650
METALS										
Antimony	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Barium	mg/L	NA	NA	NA	NA	0.170	0.168	0.013	0.150	0.180
Beryllium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Calcium	mg/L	110	NA	97	110	100	85	39	17	110
Chromium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Copper	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Lead	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Magnesium	mg/L	61	NA	51	54	58	61	7	51	74
Mercury	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/L	NA	NA	NA	NA	0.0016	0.0013	0.0006	0.0007	0.0017
Silver	mg/L	NA	NA	NA	NA	0.0001	0.0011	0.0017	0.000098	0.0030
Sodium	mg/L	140	NA	120	140	140	135	20	100	165
Thallium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Tin	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/L	NA	NA	NA	NA	0.029	0.029	0.010	0.020	0.038
Zinc	mg/L	NA	NA	NA	NA	0.025	0.039	0.033	0.018	0.089
VOLATILE ORGANIC COMPOUNDS										
1,2,4-Trimethylbenzene	µg/L	0.16	NA	0.11	**0.15**	NC	NC	NC	NC	NC
Carbon Disulfide	µg/L	0.26	NA	0.38	0.38	NC	NC	NC	NC	NC
Toluene	µg/L	0.12	NA	0.15	0.57[b]	NC	NC	NC	NC	NC
SEMI-VOLATILE ORGANIC COMPOUNDS										
bis(2-Ethylhexyl) Phthalate	µg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
HERBICIDES, PESTICIDES, & PCBs (µg/L): None Detected										

NOTES:

NA = Not Analyzed/Not Applicable

Indicates that the analyte was not detected above laboratory practical quantitation limit.
Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

NC No calculation performed. Requires a minimum of three data entries.

[b] Also found in blank.

TABLE 4
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-10
(WATER LEVEL MEASURING STATION)

ANALYTE	UNITS	Aug 1999	Dec 2000	Mar 2001	Jun 2001	Sep 2001	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY											
Chloride	mg/L	120	142	151	144	140	142	139	12	120	151
Cyanide	mg/L	NA	0.0063	0.0063	0.0063	0.00006	NC	NC	NC	NC	NC
Nitrate/Nitrite	mg/L	7.1	6.34	6.59	6.17	5.4	6.34	6.32	0.62	5.4	7.1
pH	units	6.70	7.35	7.30	7.18	7.4	7.30	7.19	0.28	6.70	7.4
Sulfate	mg/L	63	61	62	60	60	61	61	1	60	63
Sulfide	mg/L	NA	0.050	0.050	0.050	0.1	NC	NC	NC	NC	NC
Total Dissolved Solids (TDS)	mg/L	608	637	587	590	1250	608	734	289	587	1250
METALS											
Antimony	mg/L	NA	**0.009**	0.008	**0.009**	0.00012	NC	NC	NC	NC	NC
Arsenic	mg/L	NA	0.0007	0.0007	0.0007	0.00030	NC	NC	NC	NC	NC
Barium	mg/L	NA	**0.061**	0.0009	0.064	**0.061**	0.061	0.062	0.002	0.061	0.064
Beryllium	mg/L	NA	0.00032	0.00032	0.00032	0.00042	NC	NC	NC	NC	NC
Cadmium	mg/L	NA	0.004	0.004	0.004	0.00012	NC	NC	NC	NC	NC
Calcium	mg/L	NA	57	68	62	63	63	63	5	57	68
Chromium	mg/L	NA	**0.004**	0.004	0.004	**0.0030**	NC	NC	NC	NC	NC
Cobalt	mg/L	NA	0.002	0.002	0.002	**0.00040**	NC	NC	NC	NC	NC
Copper	mg/L	NA	**0.009**	0.003	0.003	**0.0020**	NC	NC	NC	NC	NC
Lead	mg/L	NA	**0.0006**	0.0004	0.0004	**0.00029**	NC	NC	NC	NC	NC
Magnesium	mg/L	NA	32	39	36	33	35	35	3	32	39
Mercury	mg/L	NA	0.00010	0.00010	0.00010	0.00043	NC	NC	NC	NC	NC
Nickel	mg/L	NA	**0.004**	0.003	0.003	**0.0033**	NC	NC	NC	NC	NC
Selenium	mg/L	NA	0.0006	0.0006	0.0006	**0.0024**	NC	NC	NC	NC	NC
Silver	mg/L	NA	**0.005**	0.003	0.003	0.000098	NC	NC	NC	NC	NC
Sodium	mg/L	NA	82	98	88	91	90	90	7	82	98
Thallium	mg/L	NA	0.020	0.0007	0.0007	0.000063	NC	NC	NC	NC	NC
Tin	mg/L	NA	NA	0.006	0.002	0.000083	NC	NC	NC	NC	NC
Vanadium	mg/L	NA	0.030	0.040	0.030	0.031	0.031	0.033	0.005	0.030	0.040
Zinc	mg/L	NA	**0.026**	0.270	0.072	0.700	0.171	0.267	0.307	0.026	0.700
VOLATILE ORGANIC COMPOUNDS (µg/L)											
Carbon Disulfide	µg/L	0.54	0.5	0.266	0.266	5.5[a]	NC	NC	NC	NC	NC
Ethylbenzene	µg/L	0.17	0.5	0.057	**0.07**	0.18	NC	NC	NC	NC	NC
SEMI-VOLATILE ORGANIC COMPOUNDS											
bis(2-Ethylhexyl) Phthalate	µg/L	NA	**2.5**[a]	0.34	**0.59**[a]	2.0	NC	NC	NC	NC	NC
HERBICIDES, PESTICIDES, & PCBs (µg/L): ND											

NOTES:

NA = Not Analyzed/Not Applicable

Indicates that the analyte was not detected above laboratory practical quantitation limit.
Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

NC No calculation performed. Requires a minimum of three data entries.

[a] Suspected laboratory/field contaminant.

TABLE 5
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-11

ANALYTE	UNITS	Dec 2000	Mar 2001	Jun 2001	Sep 2001	Dec 2004	Apr 2005
GENERAL CHEMISTRY							
Chloride	mg/L	177	177	184	180	192	200
Cyanide	mg/L	0.0063	0.0063	0.0063	0.0006	NA	NA
Nitrate as N	mg/L	0.020	0.020	0.32	**0.17**	0.018	**0.090**
pH	units	7.61	7.74	7.60	7.4	7.3	7.2
Sulfate	mg/L	82	78	85	94	91	97
Sulfide	mg/L	0.050	0.050	0.050	0.1	NA	NA
Total Dissolved Solids (TDS)	mg/L	763	733	750	750	550	760
METALS							
Antimony	mg/L	0.008	0.008	0.008	**0.00026**	NA	NA
Arsenic	mg/L	0.004	0.006	0.004	0.004	NA	NA
Barium	mg/L	**0.002**	0.0009	**0.0060**	**0.0039**	NA	NA
Beryllium	mg/L	0.00032	0.00032	0.00032	0.00042	NA	NA
Cadmium	mg/L	0.004	0.004	0.004	0.00012	NA	NA
Calcium	mg/L	90	100	98	93	110	120
Chromium	mg/L	0.004	0.004	0.004	**0.0087**	NA	NA
Cobalt	mg/L	0.002	0.002	0.002	**0.00045**	NA	NA
Copper	mg/L	**0.004**	0.003	0.003	**0.0039**	NA	NA
Lead	mg/L	**0.0007**	0.0004	0.0004	0.019	NA	NA
Magnesium	mg/L	27	32	32	31	32	35
Mercury	mg/L	0.00010	0.00010	0.00010	0.00043	NA	NA
Nickel	mg/L	**0.004**	0.003	0.020	0.013	NA	NA
Selenium	mg/L	0.003	0.0006	0.0006	**0.0015**	NA	NA
Silver	mg/L	0.003	0.003	0.003	0.000098	NA	NA
Sodium	mg/L	91	100	110	120	100	110
Thallium	mg/L	**0.030**	0.0007	0.0007	0.000063	NA	NA
Tin	mg/L	NA	0.006	0.006	0.000083	NA	NA
Vanadium	mg/L	0.003	0.003	**0.0060**	**0.0050**	NA	NA
Zinc	mg/L	**0.0091**	0.00089	0.013	0.024	NA	NA
VOLATILE ORGANIC COMPOUNDS							
Carbon Disulfide	μg/L	0.5	0.266	0.266	**0.37**[a]	0.26	0.37
Ethylbenzene	μg/L	0.5	0.057	**0.09**	0.18	0.14	0.14
Toluene	μg/L	0.5	**0.13**[a]	**0.25**[a]	0.22	**0.24**	0.15
SEMI-VOLATILE ORGANIC COMPOUNDS							
bis(2-Ethylhexyl) Phthalate	μg/L	0.33	6.6[a]	**4.2**[a]	2.0	NA	NA
Butylbenzyl Phthalate	μg/L	0.25	0.25	**0.40**[a]	2.1	NA	NA
HERBICIDES, PESTICIDES, & PCBs (μg/L): None Detected							

NOTES:

NA = Not Analyzed/Not Applicable

Indicates that the analyte was not detected above laboratory practical quantitation limit. Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

[a] Suspected laboratory/field contaminant.

TABLE 5
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-11

ANALYTE	UNITS	Aug 2005	Nov 2005	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY								
Chloride	mg/L	190	190	187	186	8	177	200
Cyanide	mg/L	NA	NA	NC	NC	NC	NC	NC
Nitrate as N	mg/L	0.10	**0.033**	0.10	0.14	0.110	0.033	0.32
pH	units	7.1	7.3	7.4	7.41	0.22	7.1	7.74
Sulfate	mg/L	86	84	86	87	6	78	97
Sulfide	mg/L	NA	NA	NC	NC	NC	NC	NC
Total Dissolved Solids (TDS)	mg/L	740	720	745	721	70	550	763
METALS								
Antimony	mg/L	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/L	NA	NA	0.004	0.005	0.001	0.004	0.006
Barium	mg/L	NA	NA	0.00	0.00	0.00	0.002	0.006
Beryllium	mg/L	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/L	NA	NA	NC	NC	NC	NC	NC
Calcium	mg/L	100	110	100	103	10	90	120
Chromium	mg/L	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/L	NA	NA	NC	NC	NC	NC	NC
Copper	mg/L	NA	NA	NC	NC	NC	NC	NC
Lead	mg/L	NA	NA	NC	NC	NC	NC	NC
Magnesium	mg/L	29	29	32	31	2	27	35
Mercury	mg/L	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/L	NA	NA	0.013	0.012	0.008	0.004	0.020
Selenium	mg/L	NA	NA	NC	NC	NC	NC	NC
Silver	mg/L	NA	NA	NC	NC	NC	NC	NC
Sodium	mg/L	97	95	100	103	10	91	120
Thallium	mg/L	NA	NA	NC	NC	NC	NC	NC
Tin	mg/L	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/L	NA	NA	NC	NC	NC	NC	NC
Zinc	mg/L	NA	NA	0.013	0.015	0.008	0.009	0.024
VOLATILE ORGANIC COMPOUNDS								
Carbon Disulfide	µg/L	0.38	0.38	NC	NC	NC	NC	NC
Ethylbenzene	µg/L	0.13	0.13	NC	NC	NC	NC	NC
Toluene	µg/L	0.15	0.15	NC	NC	NC	NC	NC
SEMI-VOLATILE ORGANIC COMPOUNDS								
bis(2-Ethylhexyl) Phthalate	µg/L	NA	NA	NC	NC	NC	NC	NC
Butylbenzyl Phthalate	µg/L	NA	NA	NC	NC	NC	NC	NC
HERBICIDES, PESTICIDES, & PCBs (µg/L): None Detected								

NOTES:
NA = Not Analyzed/Not Applicable
Indicates that the analyte was not detected above laboratory practical quantitation limit.
Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.
NC No calculation performed. Requires a minimum of three data entries.

TABLE 6
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-12

ANALYTE	UNITS	Dec 2000	Mar 2001	Jun 2001	Sep 2001	Dec 2004	Apr 2005
GENERAL CHEMISTRY							
Chloride	mg/L	115	117	119	120	120	130
Cyanide	mg/L	0.0063	0.0063	0.0063	0.0006	NA	NA
Nitrate as N	mg/L	0.24	0.28	0.28	**0.1**	0.46	0.49
pH	units	7.38	7.42	7.16	6.9	7.3	7.1
Sulfate	mg/L	38	39	38	46	44	49
Sulfide	mg/L	0.050	0.050	0.050	0.1	NA	NA
Total Dissolved Solids (TDS)	mg/L	517	490	520	510	333	540
METALS							
Antimony	mg/L	**0.020**	0.008	0.008	0.00012	NA	NA
Arsenic	mg/L	0.0007	0.0007	0.0007	**0.00045**	NA	NA
Barium	mg/L	**0.020**	0.0009	0.020	**0.017**	NA	NA
Beryllium	mg/L	0.00032	0.00032	0.00032	0.00042	NA	NA
Cadmium	mg/L	0.004	0.004	0.004	0.00012	NA	NA
Calcium	mg/L	42	47	49	48	51	55
Chromium	mg/L	**0.005**	0.004	0.004	**0.0036**	NA	NA
Cobalt	mg/L	0.002	0.002	0.002	**0.00027**	NA	NA
Copper	mg/L	**0.008**	0.003	0.003	**0.0052**	NA	NA
Lead	mg/L	**0.002**	0.0004	0.0004	**0.00010**	NA	NA
Magnesium	mg/L	26	29	30	27	29	32
Mercury	mg/L	0.00010	0.00010	0.00010	0.00043	NA	NA
Nickel	mg/L	**0.004**	0.003	0.003	**0.0025**	NA	NA
Selenium	mg/L	0.0006	**0.0007**	0.0006	**0.0023**	NA	NA
Silver	mg/L	**0.006**	0.003	0.003	0.000098	NA	NA
Sodium	mg/L	74	86	88	86	87	100
Thallium	mg/L	0.020	0.0007	0.0007	0.000063	NA	NA
Tin	mg/L	NA	0.006	0.006	0.000083	NA	NA
Vanadium	mg/L	0.030	0.030	0.030	0.028	NA	NA
Zinc	mg/L	**0.016**	0.00089	0.010	**0.0072**	NA	NA
VOLATILE ORGANIC COMPOUNDS							
Carbon Disulfide	µg/L	0.5	0.266	0.266	**0.3**[a]	0.20	0.37
SEMI-VOLATILE ORGANIC COMPOUNDS							
bis(2-Ethylhexyl) Phthalate	µg/L	**0.35**[a]	0.33	**0.79**[a]	2.0	NA	NA
HERBICIDES, PESTICIDES, & PCBs (µg/L): None Detected							

NOTES:

NA = Not Analyzed/Not Applicable

Indicates that the analyte was not detected above laboratory practical quantitation limit.
Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

[a] Suspected laboratory/field contaminant.

TABLE 6
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-12

ANALYTE	UNITS	Aug 2005	Nov 2005	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY								
Chloride	mg/L	120	120	120	120	4	115	130
Cyanide	mg/L	NA	NA	NC	NC	NC	NC	NC
Nitrate as N	mg/L	0.46	0.47	0.37	0.35	0.14	0.1	0.49
pH	units	7.0	7.0	7.13	7.16	0.19	6.9	7.42
Sulfate	mg/L	46	46	45	43	4	38	49
Sulfide	mg/L	NA	NA	NC	NC	NC	NC	NC
Total Dissolved Solids (TDS)	mg/L	510	520	514	493	66	333	540
METALS								
Antimony	mg/L	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/L	NA	NA	NC	NC	NC	NC	NC
Barium	mg/L	NA	NA	0.020	0.019	0.002	0.017	0.020
Beryllium	mg/L	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/L	NA	NA	NC	NC	NC	NC	NC
Calcium	mg/L	48	49	49	49	4	42	55
Chromium	mg/L	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/L	NA	NA	NC	NC	NC	NC	NC
Copper	mg/L	NA	NA	NC	NC	NC	NC	NC
Lead	mg/L	NA	NA	NC	NC	NC	NC	NC
Magnesium	mg/L	28	29	29	29	2	26	32
Mercury	mg/L	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/L	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/L	NA	NA	NC	NC	NC	NC	NC
Silver	mg/L	NA	NA	NC	NC	NC	NC	NC
Sodium	mg/L	89	87	87	87	7	74	100
Thallium	mg/L	NA	NA	NC	NC	NC	NC	NC
Tin	mg/L	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/L	NA	NA	0.030	0.030	0.001	0.028	0.030
Zinc	mg/L	NA	NA	0.010	0.011	0.004	0.007	0.016
VOLATILE ORGANIC COMPOUNDS								
Carbon Disulfide	µg/L	0.38	0.38	NC	NC	NC	NC	NC
SEMI-VOLATILE ORGANIC COMPOUNDS								
bis(2-Ethylhexyl) Phthalate	µg/L	NA	NA	NC	NC	NC	NC	NC
HERBICIDES, PESTICIDES, & PCBs (µg/L): None Detected								

NOTES:

NA = Not Analyzed/Not Applicable

Indicates that the analyte was not detected above laboratory practical quantitation limit. Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

NC No calculation performed. Requires a minimum of three data entries.

TABLE 7
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-13

ANALYTE	UNITS	Dec 2000	Mar 2001	Jun 2001	Sep 2001	Dec 2004	Apr 2005
GENERAL CHEMISTRY							
Chloride	mg/L	127	290	269	260	204	160
Cyanide	mg/L	0.0063	0.0063	0.0063	0.0006	NA	NA
Nitrate as N	mg/L	25.9	28.5	29.3	28	18.4	19
pH	units	7.49	7.24	7.19	6.7	7.0	6.8
Sulfate	mg/L	119	129	137	130	92	95
Sulfide	mg/L	0.050	0.050	0.050	0.1	NA	NA
Total Dissolved Solids (TDS)	mg/L	885	1010	990	1120	815	780
METALS							
Antimony	mg/L	0.008	0.008	**0.010**	0.00012	NA	NA
Arsenic	mg/L	0.002	0.0007	0.0007	**0.00098**	NA	NA
Barium	mg/L	**0.020**	0.0009	0.079	**0.073**	NA	NA
Beryllium	mg/L	0.00032	0.00032	0.00032	0.00042	NA	NA
Cadmium	mg/L	0.004	0.004	0.004	0.00012	NA	NA
Calcium	mg/L	67	100	100	110	84	75
Chromium	mg/L	0.004	0.004	0.004	**0.0056**	NA	NA
Cobalt	mg/L	0.002	0.002	0.002	**0.00055**	NA	NA
Copper	mg/L	0.003	0.003	0.003	**0.0028**	NA	NA
Lead	mg/L	**0.0006**	**0.0004**	0.00040	0.000098	NA	NA
Magnesium	mg/L	39	65	65	62	48	45
Mercury	mg/L	0.00010	0.00010	0.00010	0.00043	NA	NA
Nickel	mg/L	0.003	0.003	**0.0030**	**0.0062**	NA	NA
Selenium	mg/L	0.003	**0.0008**	0.0006	**0.0037**	NA	NA
Silver	mg/L	0.003	0.003	0.003	0.000098	NA	NA
Sodium	mg/L	110	130	130	140	110	120
Thallium	mg/L	0.020	0.0007	0.0007	0.000063	NA	NA
Tin	mg/L	NA	0.006	0.006	0.000083	NA	NA
Vanadium	mg/L	0.020	0.030	0.030	0.032	NA	NA
Zinc	mg/L	**0.021**	0.047	0.047	0.053	NA	NA
VOLATILE ORGANIC COMPOUNDS							
Acetone	µg/L	0.5	5.935	5.935	4.2	3.9	6.1
Carbon Disulfide	µg/L	0.5	0.266	0.266	**0.35**[a]	0.20	0.37
SEMI-VOLATILE ORGANIC COMPOUNDS							
bis(2-Ethylhexyl) Phthalate	µg/L	**0.99**[a]	0.33	**0.67**[a]	2.0	NA	NA
HERBICIDES, PESTICIDES, & PCBs							
2,4-D	µg/L	0.16	0.16	0.16	**0.17**	0.033	0.033

NOTES:

NA = Not Analyzed/Not Applicable

(shaded) Indicates that the analyte was not detected above laboratory practical quantitation limit. Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

[a] Suspected laboratory/field contaminant.

TABLE 7
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-13

ANALYTE	UNITS	Aug 2005	Nov 2005	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY								
Chloride	mg/L	97	170	187	197	71	97	290
Cyanide	mg/L	NA	NA	NC	NC	NC	NC	NC
Nitrate as N	mg/L	24	31	27	25.5	4.7	18.4	31
pH	units	6.7	7.1	7.05	7.03	0.28	6.7	7.49
Sulfate	mg/L	110	120	120	117	16	92	137
Sulfide	mg/L	NA	NA	NC	NC	NC	NC	NC
Total Dissolved Solids (TDS)	mg/L	720	920	903	905	133	720	1120
METALS								
Antimony	mg/L	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/L	NA	NA	NC	NC	NC	NC	NC
Barium	mg/L	NA	NA	0.073	0.057	0.032	0.020	0.079
Beryllium	mg/L	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/L	NA	NA	NC	NC	NC	NC	NC
Calcium	mg/L	45	81	83	83	21	45	110
Chromium	mg/L	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/L	NA	NA	NC	NC	NC	NC	NC
Copper	mg/L	NA	NA	NC	NC	NC	NC	NC
Lead	mg/L	NA	NA	NC	NC	NC	NC	NC
Magnesium	mg/L	31	50	49	51	13	31	65
Mercury	mg/L	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/L	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/L	NA	NA	NC	NC	NC	NC	NC
Silver	mg/L	NA	NA	NC	NC	NC	NC	NC
Sodium	mg/L	140	150	130	129	15	110	150
Thallium	mg/L	NA	NA	NC	NC	NC	NC	NC
Tin	mg/L	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/L	NA	NA	0.030	0.028	0.005	0.020	0.032
Zinc	mg/L	NA	NA	0.047	0.042	0.014	0.021	0.053
VOLATILE ORGANIC COMPOUNDS								
Acetone	µg/L	13[c]	6.2	NC	NC	NC	NC	NC
Carbon Disulfide	µg/L	0.38	0.38	NC	NC	NC	NC	NC
SEMI-VOLATILE ORGANIC COMPOUNDS								
bis(2-Ethylhexyl) Phthalate	µg/L	NA	NA	NC	NC	NC	NC	NC
HERBICIDES, PESTICIDES, & PCBs								
2,4-D	µg/L	0.033	0.012	NC	NC	NC	NC	NC

NOTES:

NA = Not Analyzed/Not Applicable

Indicates that the analyte was not detected above laboratory practical quantitation limit. Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

NC No calculation performed. Requires a minimum of three data entries.

c Documented laboratory/field contaminant.

TABLE 8
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-14

ANALYTE	UNITS	Dec 2000	Mar 2001	Jun 2001	Sep 2001	Dec 2004	Apr 2005
GENERAL CHEMISTRY							
Chloride	mg/L	159	160	155	160	149	160
Cyanide	mg/L	0.0063	0.0063	0.0063	0.0006	NA	NA
Nitrate as N	mg/L	15.6	15.5	15.1	14	13.4	14
pH	units	7.47	7.56	7.29	6.8	7.0	7.0
Sulfate	mg/L	74	70	75	71	68	72
Sulfide	mg/L	0.050	0.050	0.25	0.1	NA	NA
Total Dissolved Solids (TDS)	mg/L	697	667	667	730	657	710
METALS							
Antimony	mg/L	**0.010**	0.008	0.008	0.00012	NA	NA
Arsenic	mg/L	0.0007	**0.0009**	0.0007	**0.0014**	NA	NA
Barium	mg/L	**0.096**	0.120	0.130	0.110	NA	NA
Beryllium	mg/L	0.00032	0.00032	0.00032	0.00042	NA	NA
Cadmium	mg/L	0.004	0.004	0.004	0.00012	NA	NA
Calcium	mg/L	69	82	75	73	67	75
Chromium	mg/L	0.004	0.004	0.004	**0.0038**	NA	NA
Cobalt	mg/L	0.002	0.002	0.002	**0.00035**	NA	NA
Copper	mg/L	**0.007**	0.003	0.003	**0.0014**	NA	NA
Lead	mg/L	0.004	**0.0004**	0.004	0.000098	NA	NA
Magnesium	mg/L	39	46	43	38	38	42
Mercury	mg/L	0.00010	0.00010	0.00010	0.00043	NA	NA
Nickel	mg/L	0.003	0.003	**0.004**	**0.0067**	NA	NA
Selenium	mg/L	0.0006	**0.0008**	0.0006	**0.0032**	NA	NA
Silver	mg/L	0.003	0.003	0.003	0.000098	NA	NA
Sodium	mg/L	84	100	92	94	91	98
Thallium	mg/L	0.020	0.0007	0.0007	0.000063	NA	NA
Tin	mg/L	NA	0.006	**0.003**	0.000083	NA	NA
Vanadium	mg/L	0.030	0.030	0.030	0.025	NA	NA
Zinc	mg/L	**0.012**	0.00089	**0.0092**	**0.0054**	NA	NA
VOLATILE ORGANIC COMPOUNDS							
Carbon Disulfide	µg/L	0.5	0.266	0.266	**0.31***	0.20	0.37
SEMI-VOLATILE ORGANIC COMPOUNDS							
bis(2-Ethylhexyl) Phthalate	µg/L	0.33	0.33	**1.2***	2.0	NA	NA
HERBICIDES, PESTICIDES, & PCBs (µg/L): None Detected							

NOTES:
NA = Not Analyzed/Not Applicable
Indicates that the analyte was not detected above laboratory practical quantitation limit.
Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

TABLE 8 (CONT'D)
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-14

ANALYTE	UNITS	Aug 2005	Nov 2005	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY								
Chloride	mg/L	160	160	160	158	4	149	160
Cyanide	mg/L	NA	NA	NC	NC	NC	NC	NC
Nitrate as N	mg/L	14	14	14	14.5	0.82	13.4	15.6
pH	units	6.7	7.4	7.1	7.15	0.32	6.7	7.56
Sulfate	mg/L	69	68	71	71	3	68	75
Sulfide	mg/L	NA	NA	NC	NC	NC	NC	NC
Total Dissolved Solids (TDS)	mg/L	770	590	682	686	54	590	770
METALS								
Antimony	mg/L	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/L	NA	NA	NC	NC	NC	NC	NC
Barium	mg/L	NA	NA	0.12	0.11	0.01	0.096	0.13
Beryllium	mg/L	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/L	NA	NA	NC	NC	NC	NC	NC
Calcium	mg/L	67	67	71	72	5	67	82
Chromium	mg/L	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/L	NA	NA	NC	NC	NC	NC	NC
Copper	mg/L	NA	NA	NC	NC	NC	NC	NC
Lead	mg/L	NA	NA	NC	NC	NC	NC	NC
Magnesium	mg/L	38	38	39	40	3	38	46
Mercury	mg/L	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/L	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/L	NA	NA	NC	NC	NC	NC	NC
Silver	mg/L	NA	NA	NC	NC	NC	NC	NC
Sodium	mg/L	91	90	92	93	5	84	100
Thallium	mg/L	NA	NA	NC	NC	NC	NC	NC
Tin	mg/L	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/L	NA	NA	0.030	0.029	0.003	0.025	0.030
Zinc	mg/L	NA	NA	0.0092	0.0089	0.0033	0.0054	0.012
VOLATILE ORGANIC COMPOUNDS								
Carbon Disulfide	µg/L	0.38	0.38	NC	NC	NC	NC	NC
SEMI-VOLATILE ORGANIC COMPOUNDS								
bis(2-Ethylhexyl) Phthalate	µg/L	NA	NA	NC	NC	NC	NC	NC
HERBICIDES, PESTICIDES, & PCBs (µg/L): None Detected								

NOTES:

NA = Not Analyzed/Not Applicable

[shaded] Indicates that the analyte was not detected above laboratory practical quantitation limit. Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

NC No calculation performed. Requires a minimum of three data entries.

TABLE 9
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-A

ANALYTE	UNITS	Dec 2004	Apr 2005	Aug 2005	Nov 2005	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY										
Chloride	mg/L	447	75	120	150	135	198	169	75	447
Nirate as N	mg/L	19.9	28	27	30	27.5	26.2	4.4	19.9	30
pH	units	7.0	7.1	6.9	7.1	7.1	7.0	0.1	6.9	7.1
Sulfate	mg/L	100	89	95	100	98	96	5	89	100
Total Dissolved Solids (TDS)	mg/L	1450	670	740	760	750	905	365	670	1450
METALS										
Antimony	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Barium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Beryllium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Calcium	mg/L	150	55	58	71	65	84	45	55	150
Chromium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Copper	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Lead	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Magnesium	mg/L	86	30	31	38	35	46	27	30	86
Mercury	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Silver	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Sodium	mg/L	130	120	130	140	130	130	8	120	140
Thallium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Tin	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Zinc	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
VOLATILE ORGANIC COMPOUNDS										
Methylene Chloride	µg/L	**0.18**[a]	0.43	0.44	0.44	NC	NC	NC	NC	NC
HERBICIDES & PESTICIDES (8150/8081): None Detected										

NOTES:
NA = Not Analyzed/Not Applicable
Indicates that the analyte was not detected above laboratory practical quantitation limit.
Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.
NC No calculation performed. Requires a minimum of three data entries.
[a] Suspected laboratory/field contaminant.

TABLE 10
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-B

ANALYTE	UNITS	Dec 2004	Apr 2005	Aug 2005	Nov 2005	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY										
Chloride	mg/L	124	150	130	130	130	134	11	124	150
Nitrate as N	mg/L	0.59	0.19	0.60	0.60	0.60	0.50	0.20	0.19	0.60
pH	units	6.9	6.8	6.8	6.9	6.9	6.9	0.1	6.8	6.9
Sulfate	mg/L	51	56	53	54	54	54	2	51	56
Total Dissolved Solids (TDS)	mg/L	580	570	560	560	565	568	10	560	580
METALS										
Antimony	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Barium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Beryllium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Calcium	mg/L	66	64	59	56	62	61	5	56	66
Chromium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Copper	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Lead	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Magnesium	mg/L	31	32	29	30	31	31	1	29	32
Mercury	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Silver	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Sodium	mg/L	88	88	91	88	88	89	2	88	91
Thallium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Tin	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Zinc	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
VOLATILE ORGANIC COMPOUNDS: None Detected										
HERBICIDES & PESTICIDES (8150/8081): None Detected										

NOTES:

NA = Not Analyzed/Not Applicable

Indicates that the analyte was not detected above laboratory practical quantitation limit.
Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

NC No calculation performed. Requires a minimum of three data entries.

TABLE 11
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-C

ANALYTE	UNITS	Dec 2004	Apr 2005	Aug 2005	Nov 2005	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY										
Chloride	mg/L	131	130	140	140	136	135	6	130	140
Nitrate as N	mg/L	1.06	1.9	1.2	1.2	1.2	1.34	0.38	1.06	1.9
pH	units	7.2	6.8	6.7	6.9	6.9	6.9	0.2	6.7	7.2
Sulfate	mg/L	61	61	64	64	63	63	2	61	64
Total Dissolved Solids (TDS)	mg/L	600	600	590	570	595	590	14	570	600
METALS										
Antimony	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Barium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Beryllium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Calcium	mg/L	61	60	57	57	59	59	2	57	61
Chromium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Copper	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Lead	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Magnesium	mg/L	33	35	31	33	33	33	2	31	35
Mercury	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Silver	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Sodium	mg/L	90	100	95	92	94	94	4	90	100
Thallium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Tin	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Zinc	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
VOLATILE ORGANIC COMPOUNDS: None Detected										
HERBICIDES & PESTICIDES (8150/8081): None Detected										

NOTES:
NA = Not Analyzed/Not Applicable
Indicates that the analyte was not detected above laboratory practical quantitation limit.
Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.
NC No calculation performed. Requires a minimum of three data entries.

TABLE 12
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-D

ANALYTE	UNITS	Dec 2004	Apr 2005	Aug 2005	Nov 2005	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY										
Chloride	mg/L	1300	1200	670	690	945	965	332	670	1300
Nitrate as N	mg/L	17.5	19	22	22	20.5	20.1	2.3	17.5	22
pH	units	7.1	6.9	6.9	7.0	7.0	7.0	0.1	6.9	7.1
Sulfate	mg/L	140	140	120	110	130	128	15	110	140
Total Dissolved Solids (TDS)	mg/L	2600	3200	2200	2300	2450	2575	450	2200	3200
METALS										
Antimony	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Barium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Beryllium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Calcium	mg/L	380	350	210	230	290	293	85	210	380
Chromium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Copper	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Lead	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Magnesium	mg/L	210	200	110	120	160	160	52	110	210
Mercury	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Silver	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Sodium	mg/L	200	180	140	140	160	165	30	140	200
Thallium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Tin	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Zinc	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
VOLATILE ORGANIC COMPOUNDS										
1,2,4-Trimethylbenzene	µg/L	0.16	0.15	0.11	**0.21**	NC	NC	NC	NC	NC
Toluene	µg/L	0.12	0.15	0.15	0.94[b]	NC	NC	NC	NC	NC
HERBICIDES & PESTICIDES (8150/8081): None Detected										

NOTES:

NA = Not Analyzed/Not Applicable

Indicates that the analyte was not detected above laboratory practical quantitation limit.
Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

NC No calculation performed. Requires a minimum of three data entries.

[b] Also found in blank.

TABLE 13
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-E

ANALYTE	UNITS	Dec 2004	Apr 2005	Aug 2005	Nov 2005	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY										
Chloride	mg/L	263	270	270	290	270	273	12	263	290
Nitrate as N	mg/L	27.2	34	32	26	29.6	29.8	3.8	26	34
pH	units	7.4	7.3	7.4	7.1	7.4	7.3	0.1	7.1	7.4
Sulfate	mg/L	160	170	160	150	160	160	8	150	170
Total Dissolved Solids (TDS)	mg/L	840	1100	1100	1100	1100	1035	130	840	1100
METALS										
Antimony	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Barium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Beryllium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Calcium	mg/L	130	120	110	120	120	120	8	110	130
Chromium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Copper	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Lead	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Magnesium	mg/L	58	59	54	59	59	58	2	54	59
Mercury	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Silver	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Sodium	mg/L	160	180	190	180	180	178	13	160	190
Thallium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Tin	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Zinc	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
VOLATILE ORGANIC COMPOUNDS										
1,2,4-Trimethylbenzene	µg/L	0.16	0.15	0.11	0.34	NC	NC	NC	NC	NC
Toluene	µg/L	0.12	0.15	0.15	1.4[b]	NC	NC	NC	NC	NC
HERBICIDES & PESTICIDES (8150/8081): None Detected										

NOTES:
NA = Not Analyzed/Not Applicable
Indicates that the analyte was not detected above laboratory practical quantitation limit.
Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.
NC No calculation performed. Requires a minimum of three data entries.
[b] Also found in blank.

TABLE 14
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-F

ANALYTE	UNITS	Dec 2004	Apr 2005	Aug 2005	Nov 2005	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY										
Chloride	mg/L	426	570	510	510	510	504	59	426	570
Nitrate as N	mg/L	22.1	30	31	29	29.5	28	4	22.1	31
pH	units	7.2	7.1	6.9	7.0	7.1	7.1	0.1	6.9	7.2
Sulfate	mg/L	100	130	130	130	130	123	15	100	130
Total Dissolved Solids (TDS)	mg/L	1500	1800	1800	1800	1800	1725	150	1500	1800
METALS										
Antimony	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Barium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Beryllium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Calcium	mg/L	190	240	200	210	205	210	22	190	240
Chromium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Copper	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Lead	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Magnesium	mg/L	70	100	83	86	85	85	12	70	100
Mercury	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Silver	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Sodium	mg/L	120	140	140	150	140	138	13	120	150
Thallium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Tin	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Zinc	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
VOLATILE ORGANIC COMPOUNDS										
1,2,4-Trimethylbenzene	µg/L	0.16	0.15	0.11	**0.26**	NC	NC	NC	NC	NC
Toluene	µg/L	0.12	0.15	0.15	1.0^{b}	NC	NC	NC	NC	NC
HERBICIDES & PESTICIDES (8150/8081)										
2,4-D	µg/L	0.033	0.033	0.012	**0.19**	NC	NC	NC	NC	NC

NOTES:
NA = Not Analyzed/Not Applicable
Indicates that the analyte was not detected above laboratory practical quantitation limit.
Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.
NC No calculation performed. Requires a minimum of three data entries.
b Also found in blank.

TABLE 15
GREGORY CANYON LANDFILL
HISTORICAL SUMMARY DATA - MONITORING WELL GLA-G

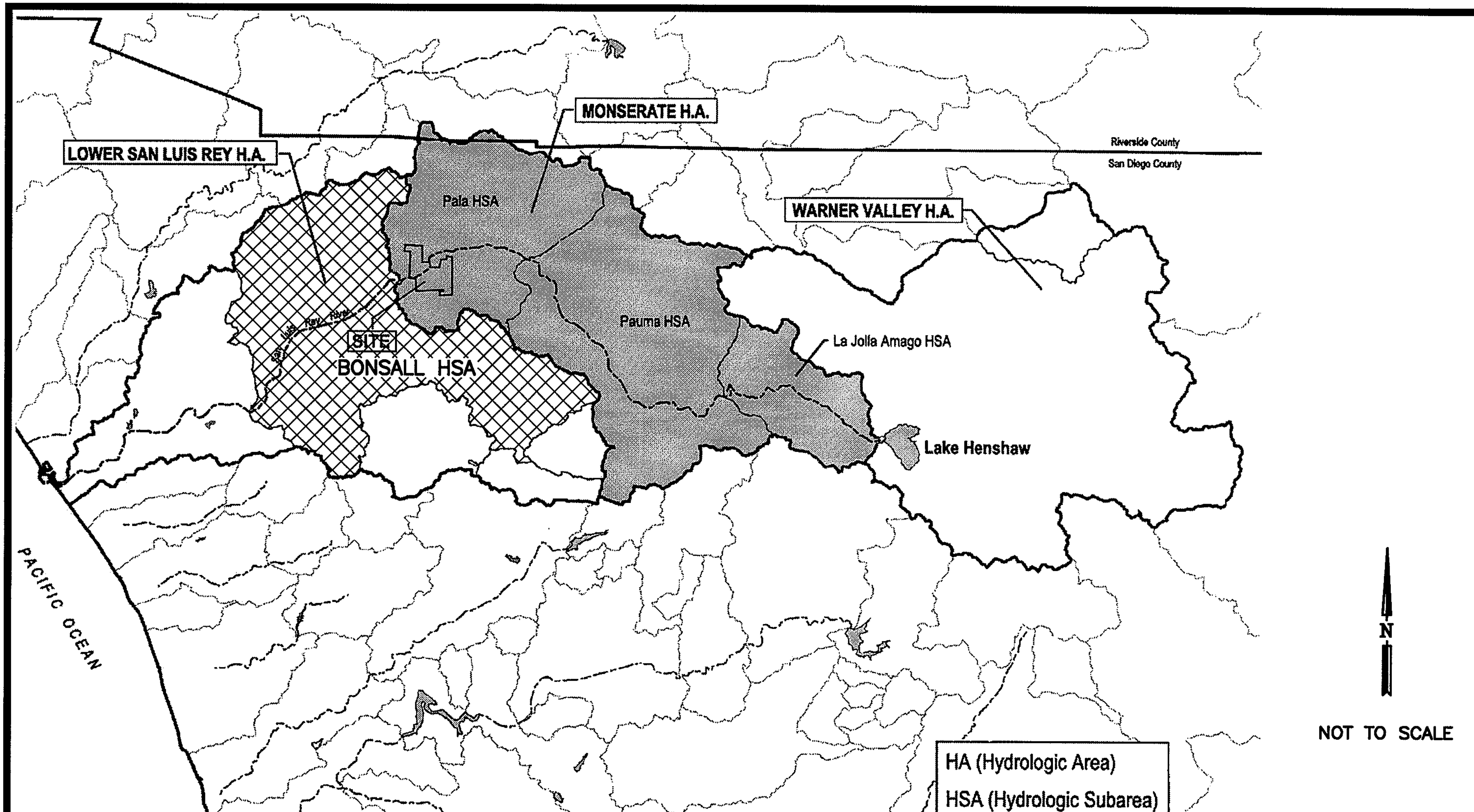
ANALYTE	UNITS	Dec 2004	Apr 2005	Aug 2005	Nov 2005	MED.	AVG.	STD. DEV.	MIN.	MAX.
GENERAL CHEMISTRY										
Chloride	mg/L	122	130	120	120	121	123	5	120	130
Nitrate as N	mg/L	0.67	0.60	0.71	0.72	0.69	0.68	0.05	0.60	0.72
pH	units	7.1	6.7	6.8	6.9	6.9	6.9	0.2	6.7	7.1
Sulfate	mg/L	49	54	51	51	51	51.3	2.1	49	54
Total Dissolved Solids (TDS)	mg/L	550	550	550	470	550	530	40	470	550
METALS										
Antimony	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Arsenic	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Barium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Beryllium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cadmium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Calcium	mg/L	55	58	49	50	53	53	4	49	58
Chromium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Cobalt	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Copper	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Lead	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Magnesium	mg/L	30	33	28	29	30	30	2	28	33
Mercury	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Nickel	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Selenium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Silver	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Sodium	mg/L	86	92	88	86	87	88	3	86	92
Thallium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Tin	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Vanadium	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
Zinc	mg/L	NA	NA	NA	NA	NC	NC	NC	NC	NC
VOLATILE ORGANIC COMPOUNDS: None Detected										
HERBICIDES & PESTICIDES (8150/8081): None Detected										

NOTES:

NA = Not Analyzed/Not Applicable

Indicates that the analyte was not detected above laboratory practical quantitation limit.
Value listed is laboratory detection limit or estimated trace (BOLDED) concentration.

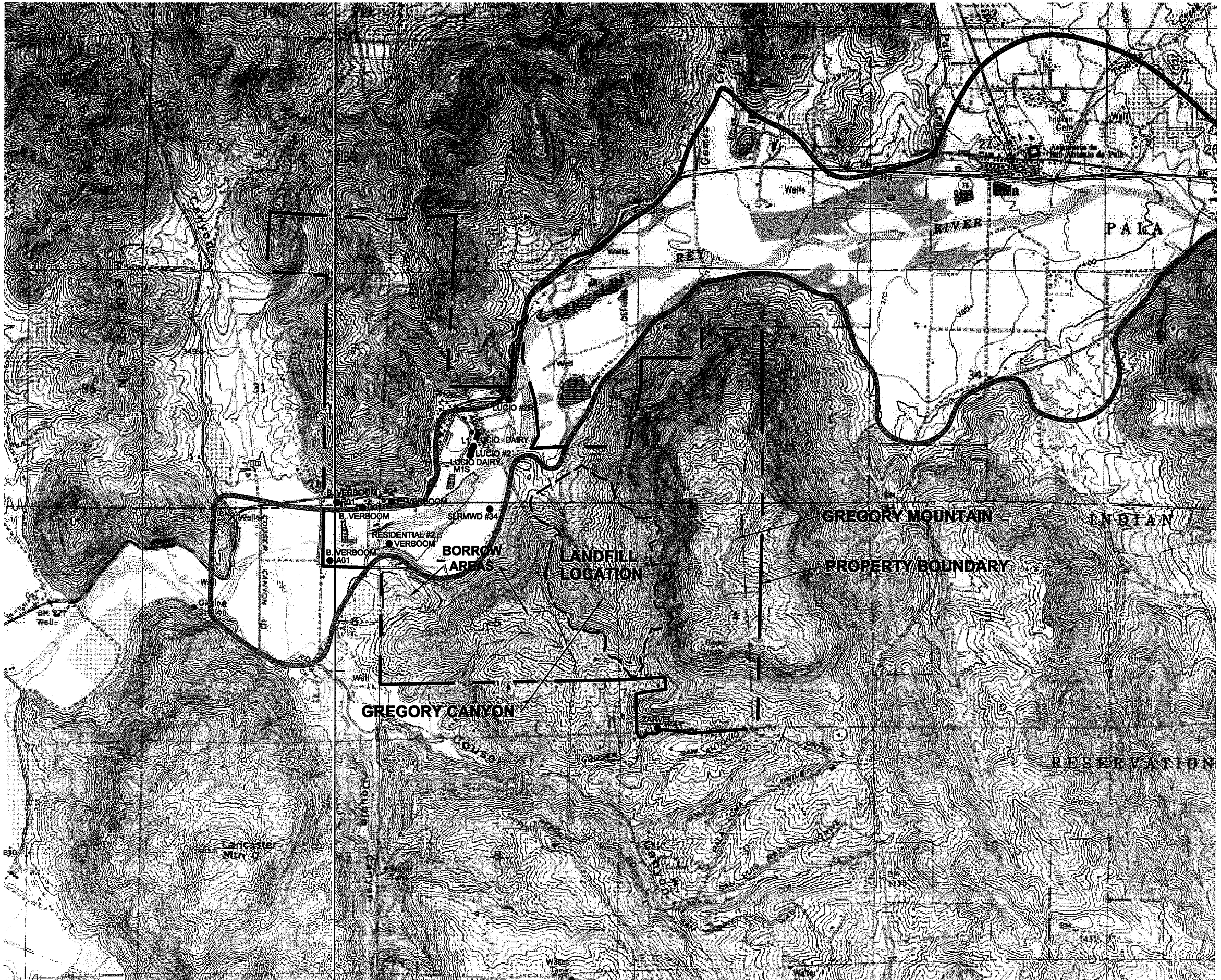
NC No calculation performed. Requires a minimum of three data entries.



SOURCES:
SANDAG GIS DATA, 1997
DAVID EVANS AND ASSOCIATES, INC., 1999
PCR SERVICES CORPORATION, 1999

FIGURE 1

SAN LUIS REY HYDROLOGIC UNIT		
WATER SUPPLY REPORT GREGORY CANYON LANDFILL SAN DIEGO COUNTY, CALIFORNIA		
GeoLogic Associates Geologists, Hydrogeologists, and Engineers		
DRAWN BY: VL	DATE: FEBRUARY 2006	JOB NO. 9539



EXPLANATION:

SLRMWD #34 ● APPROXIMATE LOCATION OF ON-SITE WATER SUPPLY WELL

LUCIO #2R ● APPROXIMATE LOCATION OF ON-SITE MONITORING WELL

APPROXIMATE LIMIT OF PALA BASIN

REFERENCE:

USGS 7.5 MINUTE PALA (1988) AND BONSALL (1975) CALIFORNIA QUADRANGLES

CALIFORNIA DEPARTMENT OF WATER RESOURCES WATER WELL DRILLERS REPORTS

SAN DIEGO COUNTY WATER AUTHORITY GROUNDWATER REPORT (1997)

N

APPROXIMATE SCALE: 1" = 2300'

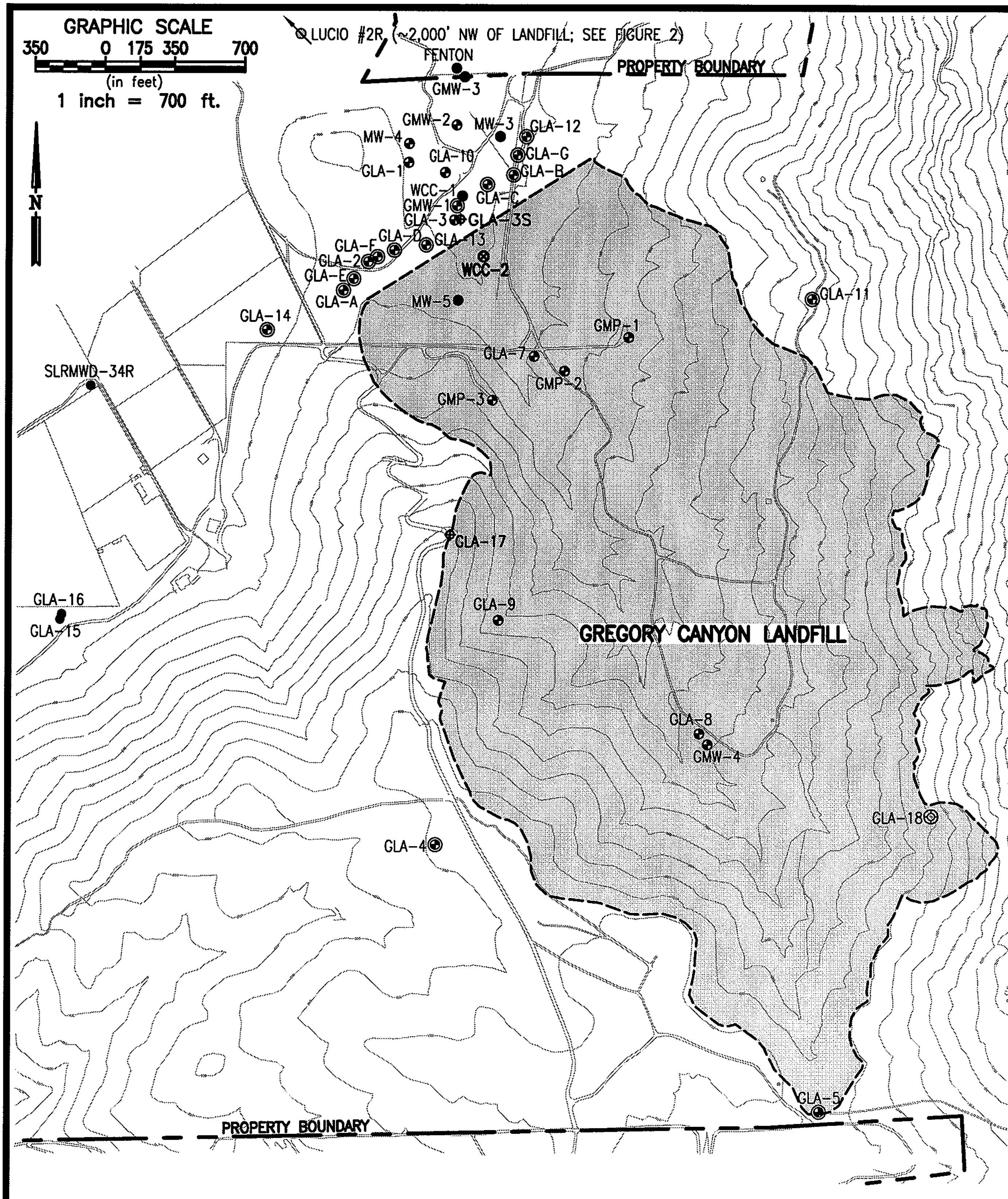
FIGURE 2

SITE LOCATION MAP

WATER SUPPLY REPORT
GREGORY CANYON LANDFILL
SAN DIEGO COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	FEBRUARY 2006	9539



EXPLANATION:

- ALLUVIAL/COLLUVIAL WELL
- BEDROCK WELL
- WELL SCREENED ACROSS ALLUVIUM AND BEDROCK
- BEDROCK WATER QUALITY MONITORING WELL
- EXPLORATORY BORING (GLA, 2004)
- PROPOSED MONITORING WELL

FIGURE 3

WELL LOCATION MAP

WATER SUPPLY REPORT
GREGORY CANYON LANDFILL
SAN DIEGO COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	FEBRUARY 2006	9539

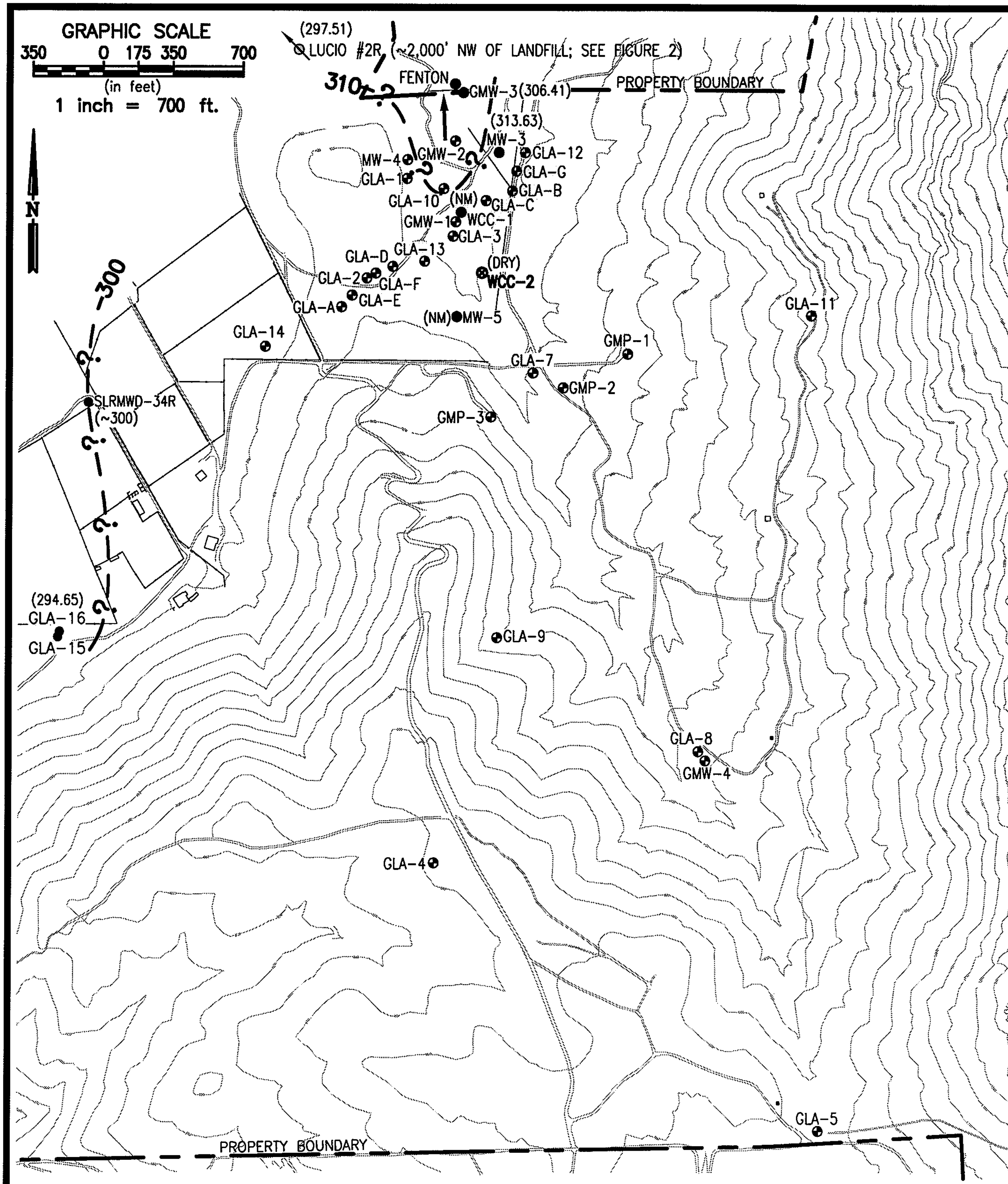


FIGURE 4A

EXPLANATION:

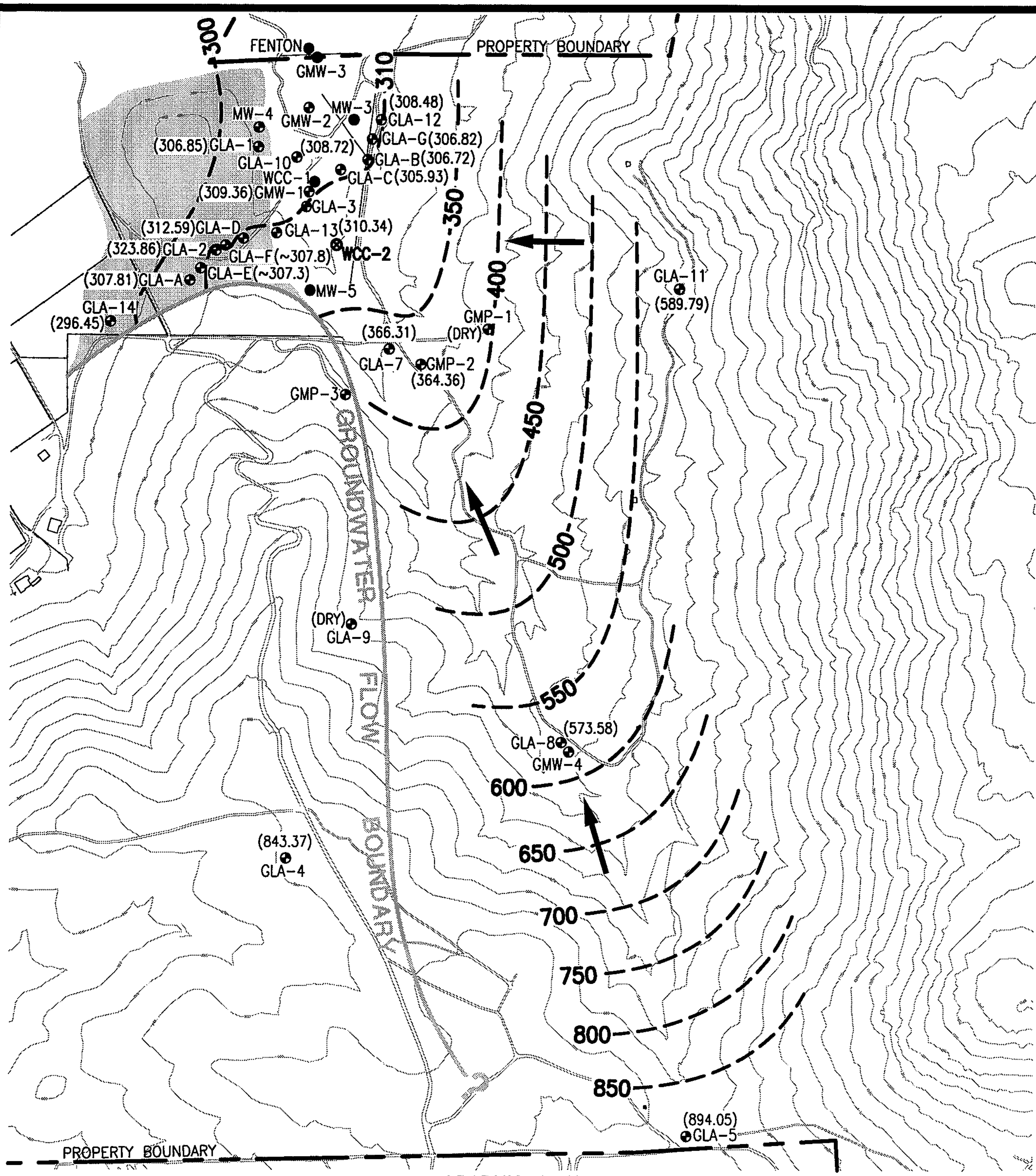
- ● ALLUVIAL/COLLUVIAL WELL
- ⊕ BEDROCK WELL
- ⊗ WELL SCREENED ACROSS ALLUVIUM AND BEDROCK
- -?— —310— WATER TABLE ELEVATION CONTOUR (APRIL 2005)
- ← GROUNDWATER FLOW DIRECTION

CONFIGURATION OF WATER TABLE IN THE ALLUVIAL/COLLUVIAL AQUIFER (APRIL 2005)

WATER SUPPLY REPORT
GREGORY CANYON LANDFILL
SAN DIEGO COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	FEBRUARY 2006	9539



GRAPHIC SCALE

350 0 175 350 700

(in feet)

1 inch = 700 ft.

EXPLANATION:

- ALLUVIAL/COLLUVIAL WELL
- BEDROCK WELL
- WELL SCREENED ACROSS ALLUVIUM AND BEDROCK
- --750-- PIEZOMETRIC SURFACE ELEVATION CONTOUR (AUGUST 2005)
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER BARRIER (QUERIED WHERE UNCERTAIN OF SOUTHERN EXTENSION)
- LOW PERMEABILITY ZONE

N

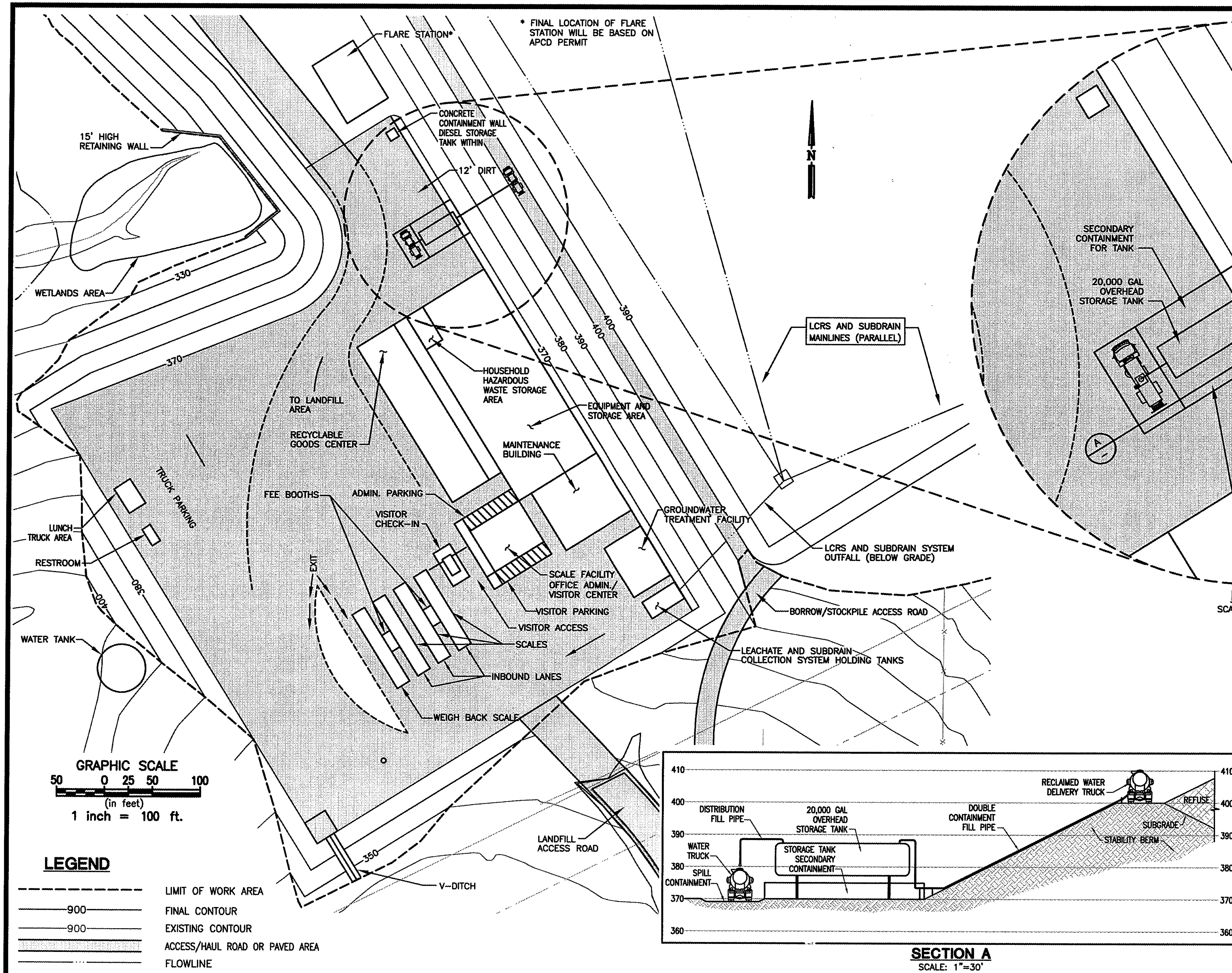
FIGURE 4B

CONFIGURATION OF PIEZOMETRIC SURFACE IN THE BEDROCK AQUIFER (8/03/2005)

WATER SUPPLY REPORT
GREGORY CANYON LANDFILL
SAN DIEGO COUNTY, CALIFORNIA

GeoLogic Associates
Geologists, Hydrogeologists, and Engineers

DRAWN BY:	DATE:	JOB NO.
VL	FEBRUARY 2006	9539



SOURCE: BAS, 2006

FIGURE 5

RECYCLED WATER STORAGE AND DISTRIBUTION PLAN

WATER SUPPLY REPORT
GREGORY CANYON LANDFILL
SAN DIEGO COUNTY, CALIFORNIA

GeoLogic Associates

DRAWN BY:	DATE:	JOB NO.
VL	FEBRUARY 2006	9539

APPENDIX A

WELL GLA-3 AQUIFER TEST DATA EVALUATION

MEMORANDUM

TO: Sarah Battelle, GLA

FROM: Ralph Murphy, GLA
Jason Sapp, GLA

DATE: December 5, 2005

RE: Well GLA-3 Aquifer Test Data Evaluation
Gregory Canyon, San Diego County, California

Well pumping performance data were reviewed to estimate the long-term yield that may be obtained using well GLA-3 to supply water for the proposed Gregory Canyon Landfill in San Diego County, California. Well GLA-3 was constructed without well screen to a depth of 150 feet in fractured granitic rock in November 1996 and using 45 feet of schedule 80 PVC casing to isolate water-bearing rock from overlying alluvial materials (GeoLogic Associates [GLA], 1997). The pumping test data evaluated herein have been previously reported (GLA, 2001, 2004).

Data obtained by GLA during aquifer tests completed on November 27, 2000 and June 18, 2004 were evaluated using the AquiferTest Pro software package (Waterloo Hydrogeologic Inc., version 3.5 [2002]) and the Cooper-Jacob Step Test algorithm to estimate aquifer hydraulic properties including hydraulic conductivity (K) and transmissivity (T). As shown on the attached pumping test analysis reports, and as summarized on Table 1, the K and T values that were calculated for the 2004 pumping test compare favorably with the results obtained for the 2000 data set, with an average T value for the aquifer near well GLA-3 of approximately 365 feet-squared per day (ft^2/d). Transmissivity is a function of effective aquifer thickness and was estimated to be approximately 60 feet at well GLA-3 based on tracer tests completed in the well borehole in December 1996 (GLA, 1997). Below a depth of approximately 95 feet, bedrock fractures in the well bore are apparently less numerous and more tightly spaced, resulting in little water production from deeper zones.

Using observed drawdown data measured in well GLA-3 and in observation wells GMW-1, GLA-B, and GLA-12, the RockWorks 98 software package's Drawdown Calculator (RockWare Inc., 1998) was then used to iteratively back-calculate appropriate Storativity (S) and Transmissivity (T) values for the fractured bedrock aquifer near well GLA-3. As shown in the attached drawdown calculations, the "best fit" between observed and calculated drawdown for the data sets was obtained using a T value of 550 ft^2/d, and an S value of 0.09.

Using the best fit T and S results, the RockWorks software was again employed to calculate what the drawdown would be in well GLA-3 pumping at discharge rates of 10, 15, and 20 gallons per minute (gpm) after periods of 2, 20, 200 and 2000 days of continuous pumping. A shown on Figure 1, these calculations indicate that pumping rates greater than 15 gpm (21,600 gallons per day [gpd]) will draw groundwater levels below approximately 53 feet (near the base of the effective aquifer) after 2000 days ($\pm$5.5 years) of pumping. These data also indicate that the long-term sustainable yield in GLA-3 is approximately 12 gpm (17,280 gpd).

Climate data available from the San Diego County Water Authority (www.sdcwa.org) were evaluated to develop an estimate of the "safe yield" in the Gregory Canyon area. Pumping that exceeds the amount of groundwater flowing in, or surface water infiltrating into, the fractured aquifer near well GLA-3 will exceed the aquifer's safe yield. The basin area surrounding Gregory Canyon is approximately 415 acres. Assuming that infiltration and aquifer recharge are approximately 5% of the approximately 25 inches of rain that fall on average each year at the site, the safe yield near well GLA-3 is calculated to be about 14.1 million gallons per year, or about 27 gpm. While use of an areal recharge rate of 5% is common for hydrologic analyses in southern California (e.g., Woolfenden and Koczot, 2001), it should be noted that the terrain in Gregory Canyon is locally steep with associated high runoff rates. Accordingly, actual infiltration (aquifer recharge) rates in the area could be less than 5% of rainfall with a corresponding decline in safe yield.

Of note, it is estimated that operations at the Gregory Canyon Landfill will require 40,000 gallons of water a day, or the equivalent of pumping about 28 gpm. This volume is slightly more than the average rate of recharge that can be expected to replenish the aquifer annually, and likely can not be entirely derived from the aquifer underlying the landfill without steadily reducing groundwater resources beneath the site. Moreover, as the land surface overlying the aquifer is reduced through time by the placement of refuse in the landfill, the volume of precipitation runoff that percolates into the aquifer may decline thus further reducing the volume of water available on site.

ATTACHMENTS

Table 1 – Well GLA-3 Aquifer Test Results
Figure 1 – Forecasted Drawdown Comparison
Pumping Test Analysis Reports
Iterative Drawdown Analysis Reports

REFERENCES

GeoLogic Associates, 1997, "Phase 5 Hydrogeologic Investigation," Proposed Gregory Canyon Landfill, San Diego County, California, prepared for Gregory Canyon Landfill, LTD., December.

__________, 2001, "Phase 5 Supplemental Investigation, Results of Pumping Tests," prepared for Gregory Canyon Ltd., January.

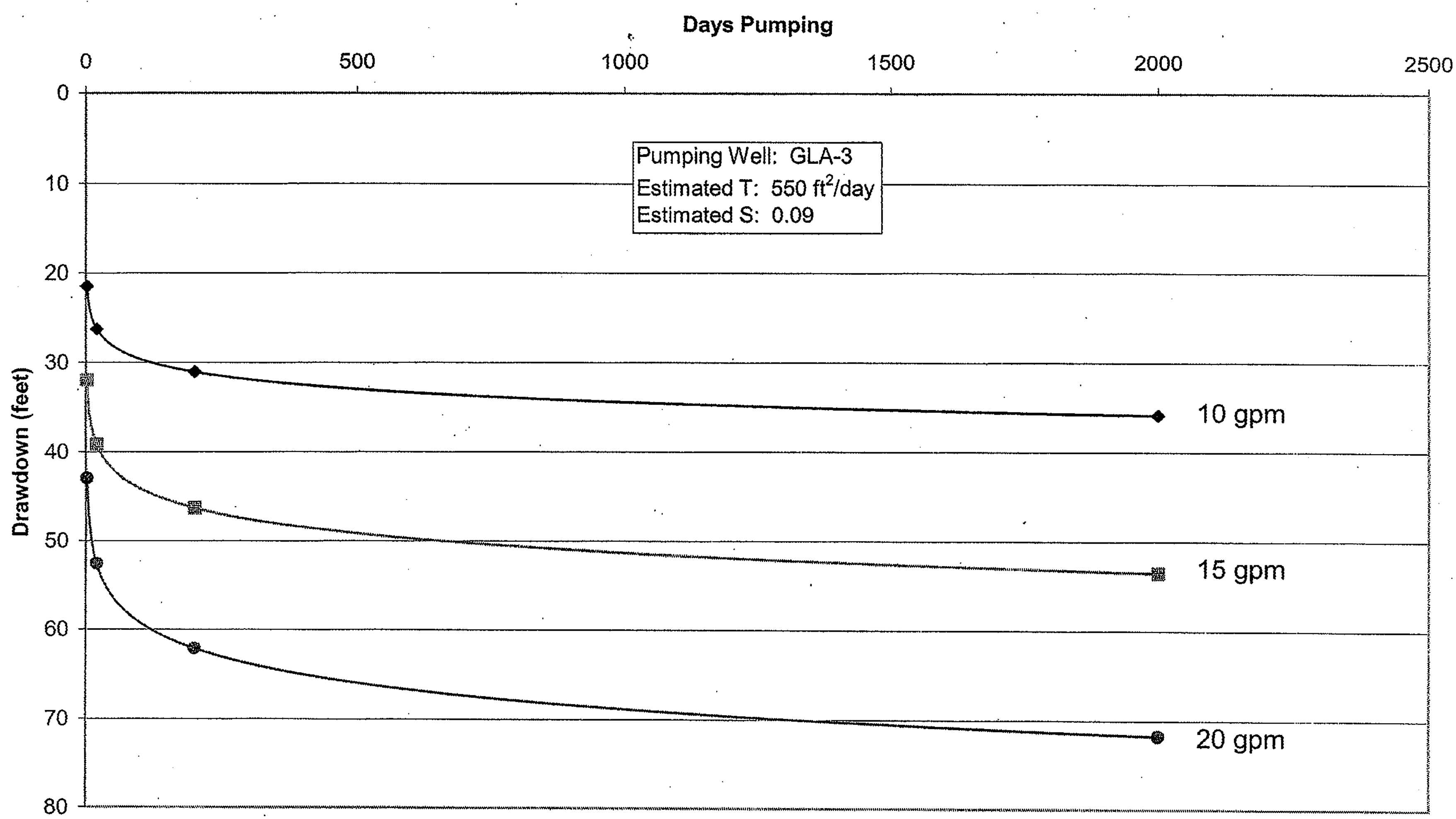
__________, 2004, "Supplemental Hydrogeologic Investigation," Gregory Canyon Landfill, San Diego County, California, prepared for Gregory Canyon Landfill, LTD., October.

Woolfenden, L.R., and Koczot, K.M., 2001, "Numerical Simulation of Ground-Water Flow and Assessment of the effects of Artificial Recharge in the Rialto-Colton Basin, San Bernardino County, California", U.S. Geological Survey Water-Resources Investigations Report 00-4243.

Table 1
Well GLA-3 Aquifer Test Results
Gregory Canyon Landfill, San Diego County

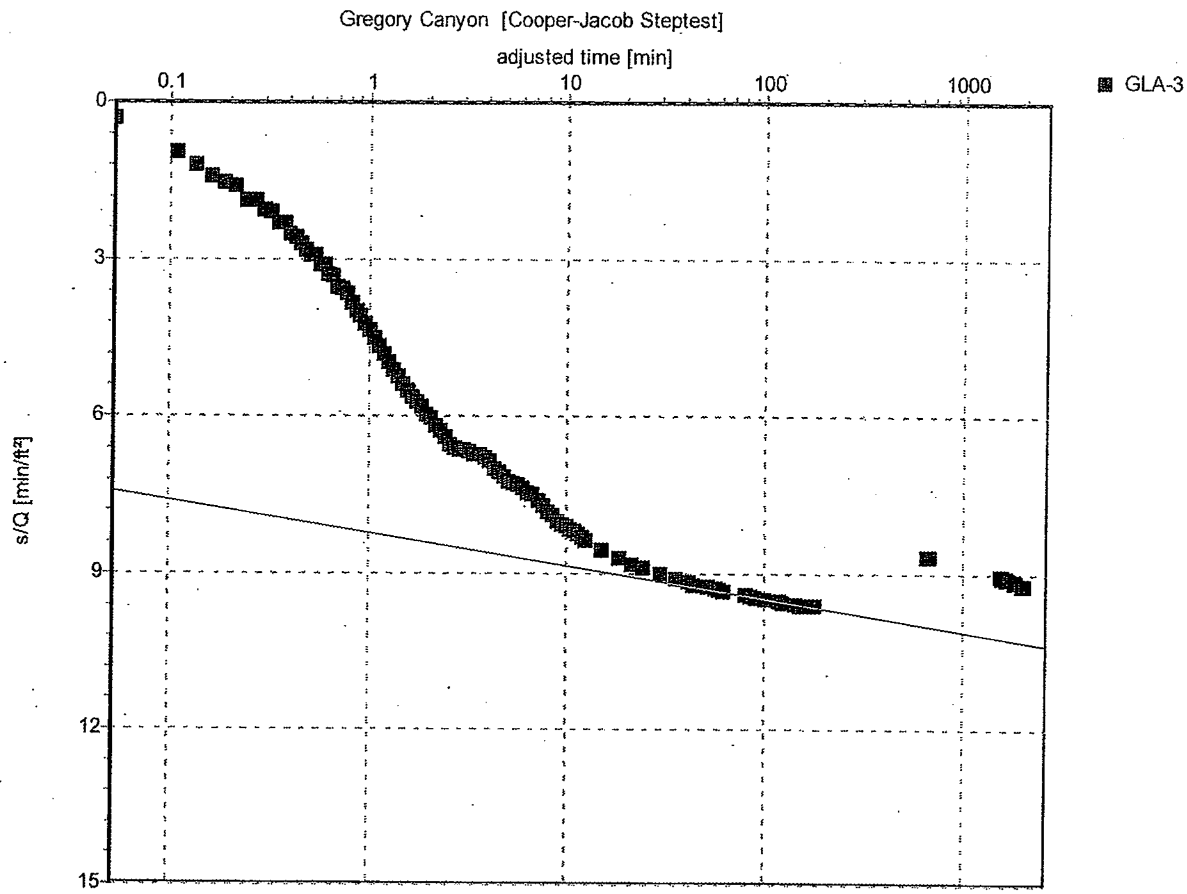
Date	Well	Distance From Pumping Well (feet)	Analytical Method	Data Points	Hydraulic Conductivity (ft/day)	Transmissivity (ft^2/day)
Nov. 27, 2000	GLA-3	1	Cooper-Jacob (time-drawdown)	Late	5.89	352
	GMW-1	51	Cooper-Jacob (time-drawdown)	Late	6.26	325
Jul. 18, 2004	GLA-3	1	Cooper-Jacob Step Test	Middle	6.95	417
	GLA-B	370	Cooper-Jacob Step Test	All	39.7	2380
	GLA-12	545	Cooper-Jacob Step Test	Middle	39.2	2350

Figure 1
Forecasted Drawdown Comparison
Gregory Canyon Landfill, San Diego County



GeoLogic Associates
1831 Commercenter East
San Bernardino, California 92408
Phone (909) 383-8728

Pumping Test Analysis Report	
Project:	GC Analyses (aquifer b=60)
Number:	1995.0039.074
Client:	Gregory Canyon, LTD



Pumping Test: **Gregory Canyon**

Analysis Method: **Cooper-Jacob Steptest**

Analysis Results:

Transmissivity:	4.17E+2 [ft²/d]	Conductivity:	6.95E+0 [ft/d]

Test parameters:

Pumping Well:	PW	Aquifer Thickness:	60 [ft]
Casing radius:	0.35 [ft]	Unconfined Aquifer	
Screen length:	120 [ft]		
Boring radius:	0.35 [ft]		
Discharge Rate:	14.933704 [U.S. gal/min]		

Comments:

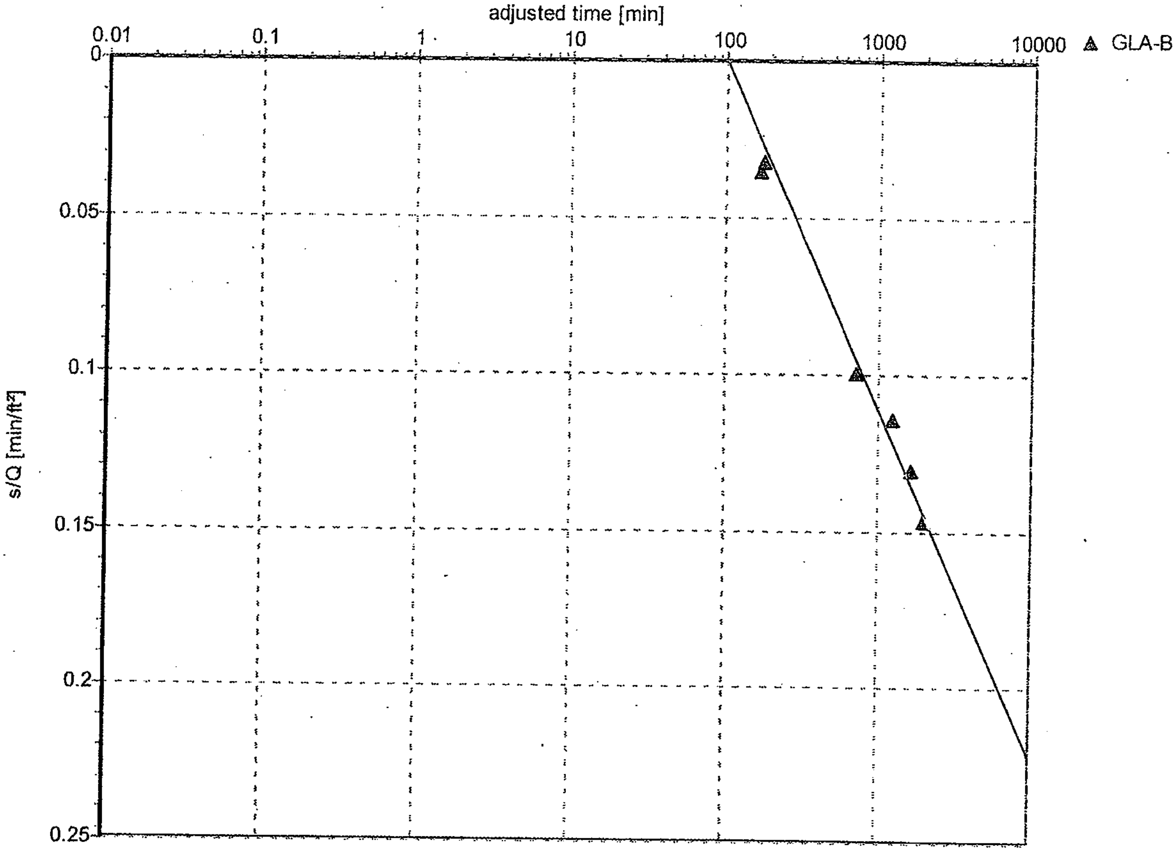
Evaluated by: JAS

Evaluation Date: 12/1/2005

GeoLogic Associates
1831 Commercenter East
San Bernardino, California 92408
Phone (909) 383-8728

Pumping Test Analysis Report

Project: GC GLA-3 Analyses (aquifer b=60)
Number: 1995.0039.074
Client: Gregory Canyon, LTD



Pumping Test: **Gregory Canyon**

Analysis Method: **Cooper-Jacob Steptest**

Analysis Results:	Transmissivity:	2.38E+3 [ft²/d]	Conductivity:	3.97E+1 [ft/d]
	Storativity:	2.73E-3		

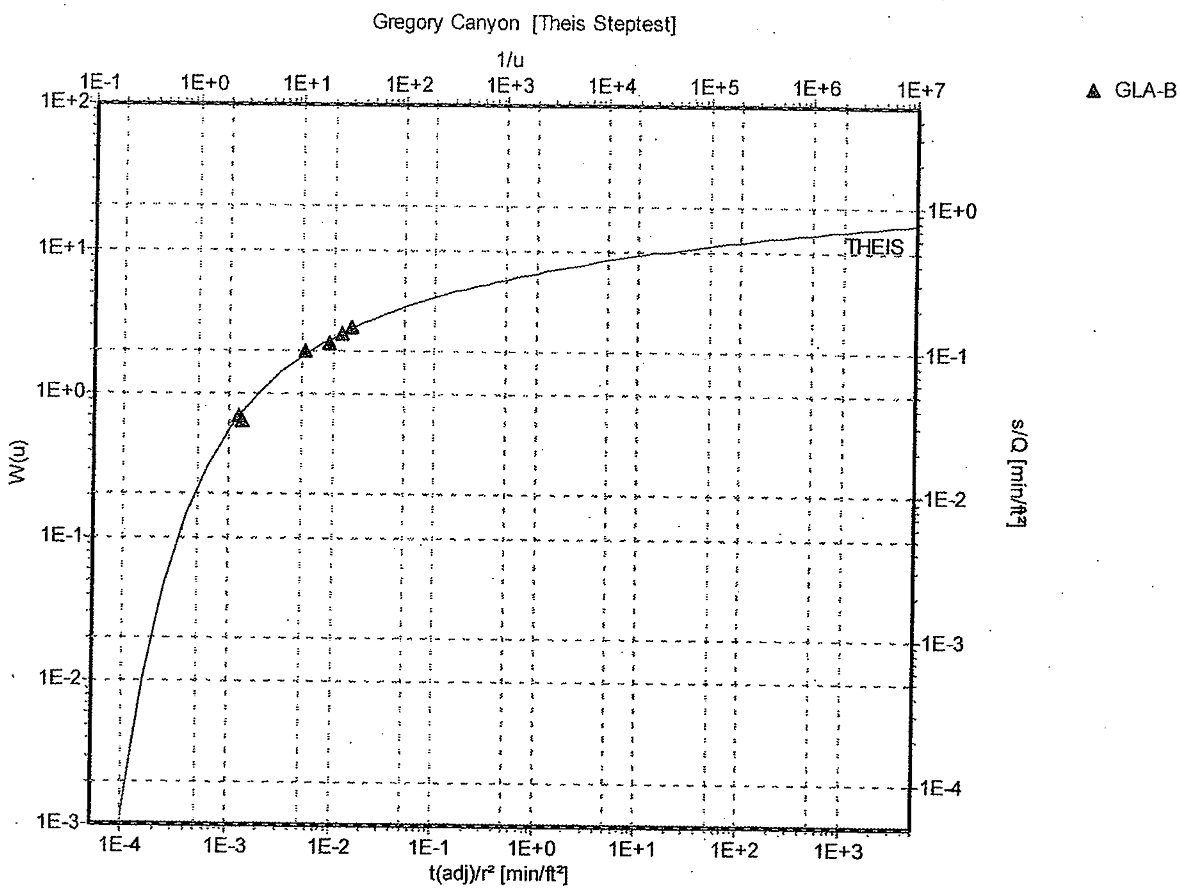
Test parameters:	Pumping Well:	PW	Aquifer Thickness:	60 [ft]
	Casing radius:	0.35 [ft]	Confined Aquifer	
	Screen length:	120 [ft]		
	Boring radius:	0.35 [ft]		
	Discharge Rate:	14.933704 [U.S. gal/min]		

Comments:

Evaluated by:

Evaluation Date: 12/1/2005

GeoLogic Associates 1831 Commercenter East San Bernardino, California 92408 Phone (909) 383-8728	**Pumping Test Analysis Report** Project: GC GLA-3 Analyses (aquifer b=60) Number: 1995.0039.074 Client: Gregory Canyon, LTD



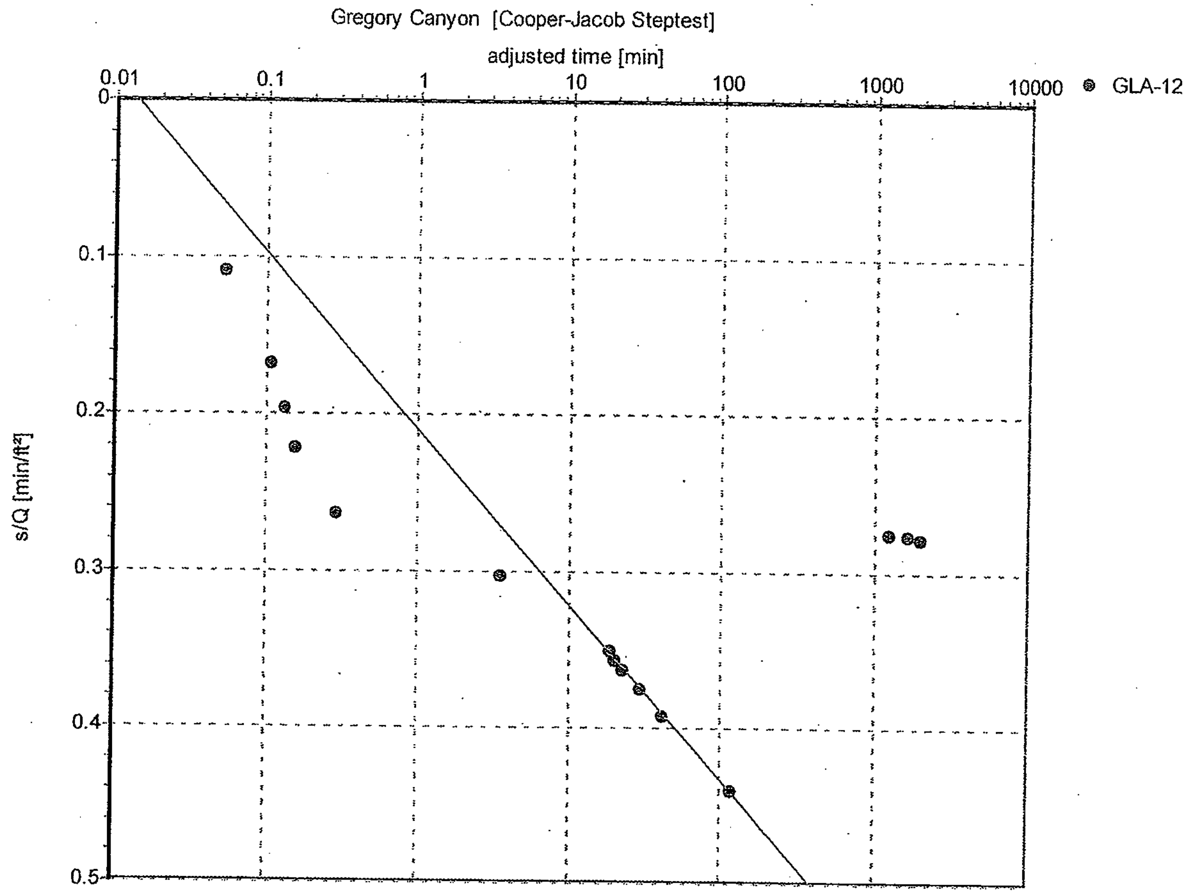
Pumping Test:	**Gregory Canyon**			
Analysis Method:	**Theis Steptest**			
Analysis Results:	Transmissivity:	2.30E+3 [ft²/d]	Conductivity:	3.83E+1 [ft/d]
	Storativity:	3.21E-3		
Test parameters:	Pumping Well:	PW	Aquifer Thickness:	60 [ft]
	Casing radius:	0.35 [ft]	Confined Aquifer	
	Screen length:	120 [ft]		
	Boring radius:	0.35 [ft]		
	Discharge Rate:	14.933704 [U.S. gal/min]		

Comments:

Evaluated by: JAS

Evaluation Date: 12/1/2005

GeoLogic Associates 1831 Commercenter East San Bernardino, California 92408 Phone (909) 383-8728	**Pumping Test Analysis Report** Project: GC GLA-3 Analyses (aquifer b=60) Number: 1995.0039.074 Client: Gregory Canyon, LTD



Pumping Test: **Gregory Canyon**

Analysis Method: **Cooper-Jacob Steptest**

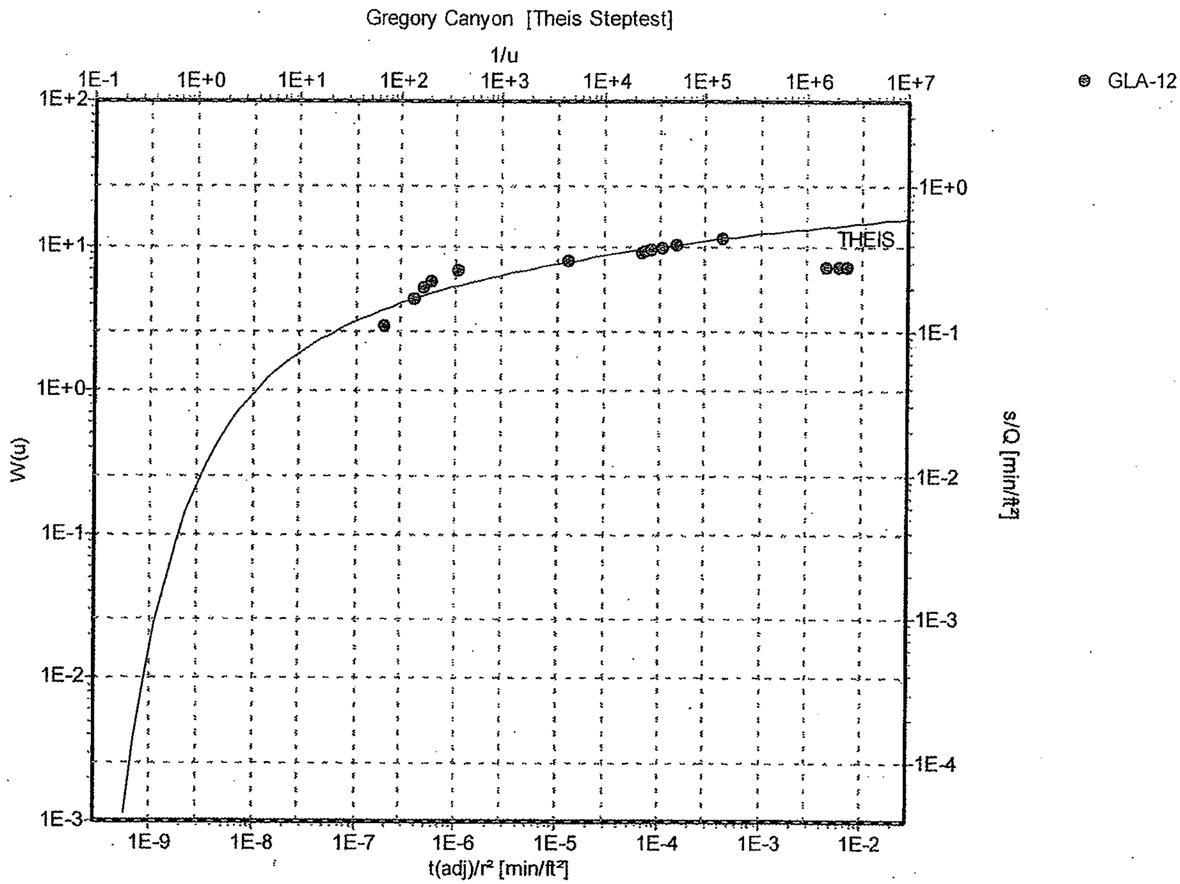
Analysis Results:	Transmissivity:	2.35E+3 [ft²/d]	Conductivity:	3.92E+1 [ft/d]
	Storativity:	1.81E-7		
Test parameters:	Pumping Well:	PW	Aquifer Thickness:	60 [ft]
	Casing radius:	0.35 [ft]	Confined Aquifer	
	Screen length:	120 [ft]		
	Boring radius:	0.35 [ft]		
	Discharge Rate:	14.933704 [U.S. gal/min]		

Comments:

Evaluated by: JAS

Evaluation Date: 12/1/2005

GeoLogic Associates 1831 Commercenter East San Bernardino, California 92408 Phone (909) 383-8728	**Pumping Test Analysis Report** Project: GC GLA-3 Analyses (aquifer b=60) Number: 1995.0039.074 Client: Gregory Canyon, LTD



Pumping Test: **Gregory Canyon**

Analysis Method: **Theis Steptest**

Analysis Results:	Transmissivity:	2.95E+3 [ft²/d]	Conductivity:	4.91E+1 [ft/d]
	Storativity:	2.31E-8		

Test parameters:	Pumping Well:	PW	Aquifer Thickness:	60 [ft]
	Casing radius:	0.35 [ft]	Confined Aquifer	
	Screen length:	120 [ft]		
	Boring radius:	0.35 [ft]		
	Discharge Rate:	14.933704 [U.S. gal/min]		

Comments:

Evaluated by: JAS

Evaluation Date: 12/1/2005

DrawDown

Pumping Rate: 14.9 Gallons Per Minute

Well Radius: 0.35 Feet

Pumping Duration: 1.9 Days

Transmisivity: 550 Square Feet Per Day

Storativity: .09

Saturated Thickness: 60 Feet

Distance Increments: 0.5 Feet

Units: Metric / Imperial

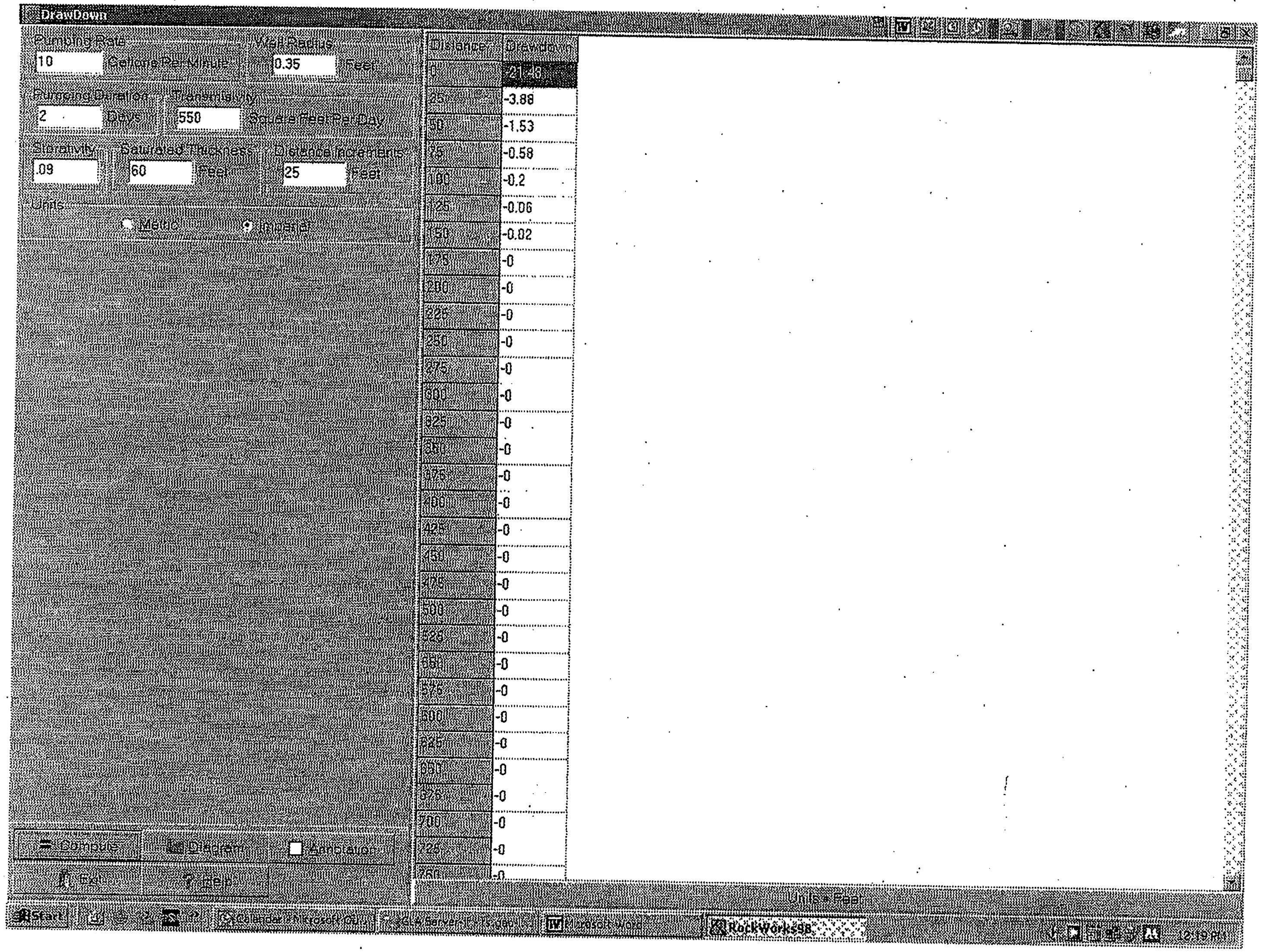
Distance	Drawdown
0	-31.84
0.5	-29.63
1	-25.32
1.5	-22.81
2	-21.02
2.5	-19.64
3	-18.51
3.5	-17.55
4	-16.72
4.5	-15.99
5	-15.34
5.5	-14.75
6	-14.22
6.5	-13.72
7	-13.26
7.5	-12.84
8	-12.44
8.5	-12.07
9	-11.72
9.5	-11.39
10	-11.08
10.5	-10.78
11	-10.49
11.5	-10.22
12	-9.97
12.5	-9.72
13	-9.48
13.5	-9.25
14	-9.03
14.5	-8.82
15	-8.62

Compute | Diagram | Annotation

Exit | Help

Units = Feet

Start | Calendar - Microsoft Ou... | GLA Server... | Microsoft Word | RockWorks98 | 12:08 PM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Pumping Rate
10
Gallons Per Minute
Well Radius
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Feet
Purging Duration
2
Days
Transmissivity
550
Square Feet Per Day
Storativity
.09
Saturated Thickness
60
Feet
Distance Increments
25
Feet
Units
Metric
Imperial
Compute
Diagram
Annotation
Exit
Help
Distance
Drawdown
0
-21.48
25
-3.88
50
-1.53
75
-0.58
100
-0.2
125
-0.06
150
-0.02
175
-0
200
-0
225
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250
-0
275
-0
300
-0
325
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350
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400
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500
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525
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550
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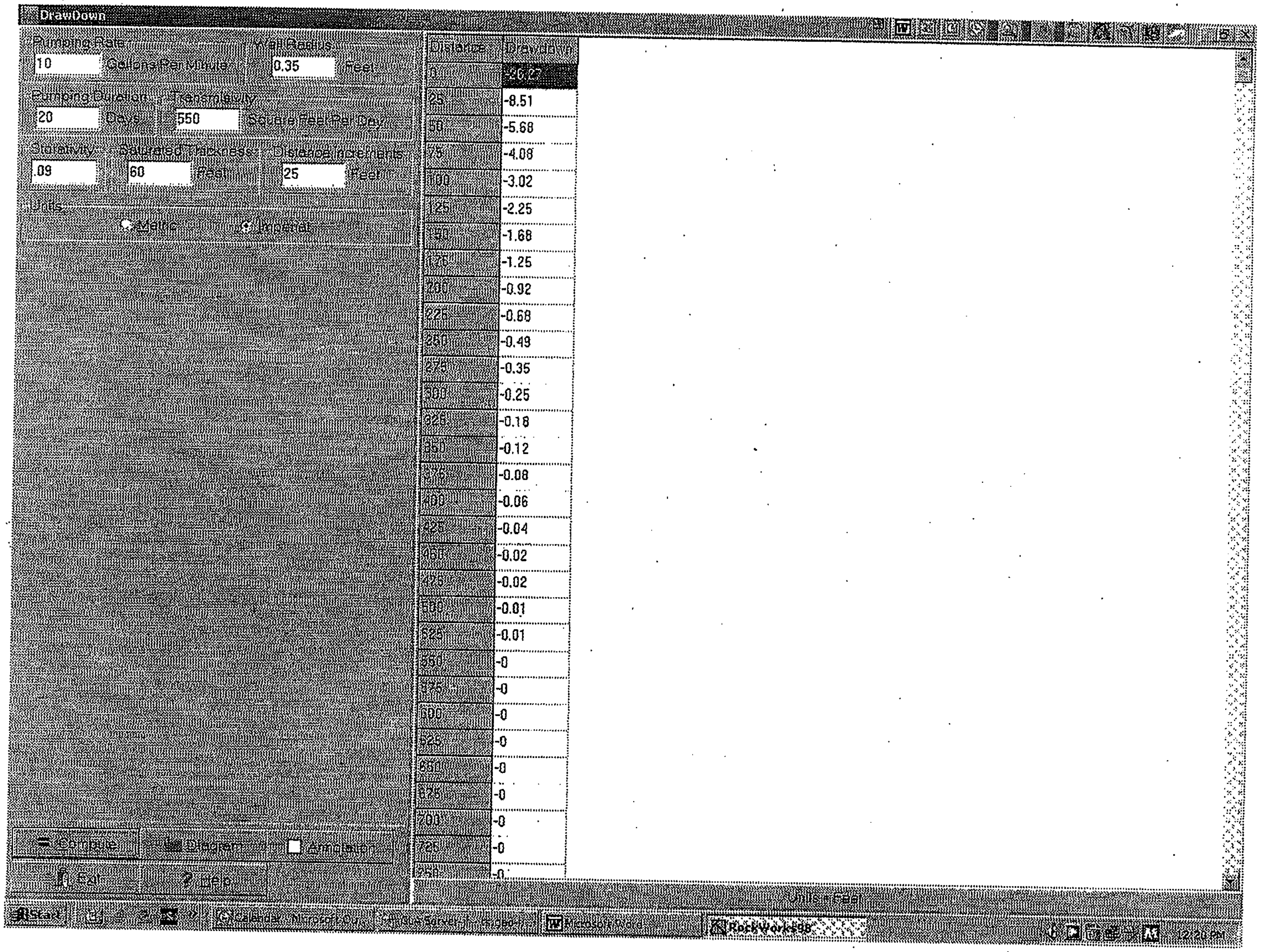
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Well Radius
0.35 Feet
Pumping Duration
20 Days
Transmissivity
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Storativity
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Saturated Thickness
60 Feet
Distance Increments
25 Feet
Units
Metric
Imperial
Compute
Diagram
Annotation
Exit
Help
Distance Drawdown
0 -20.27
25 -8.51
50 -5.68
75 -4.08
100 -3.02
125 -2.25
150 -1.68
175 -1.25
200 -0.92
225 -0.68
250 -0.49
275 -0.35
300 -0.25
325 -0.18
350 -0.12
375 -0.08
400 -0.06
425 -0.04
450 -0.02
475 -0.02
500 -0.01
525 -0.01
550 -0
575 -0
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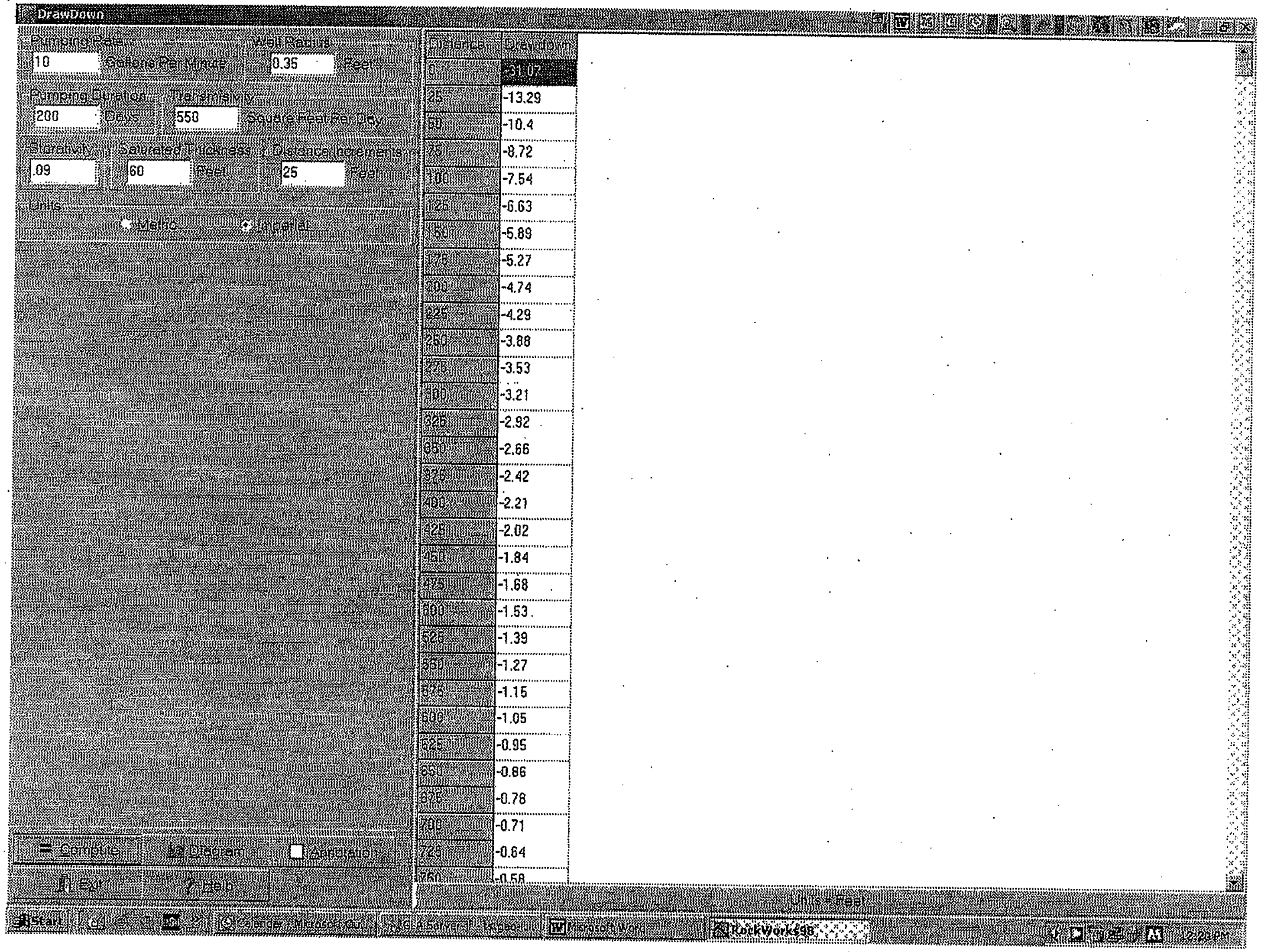

Distance	Drawdown
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25	-13.29
50	-10.4
75	-8.72
100	-7.54
125	-6.63
150	-5.89
175	-5.27
200	-4.74
225	-4.29
250	-3.88
275	-3.53
300	-3.21
325	-2.92
350	-2.66
375	-2.42
400	-2.21
425	-2.02
450	-1.84
475	-1.68
500	-1.53
525	-1.39
550	-1.27
575	-1.15
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625	-0.95
650	-0.86
675	-0.78
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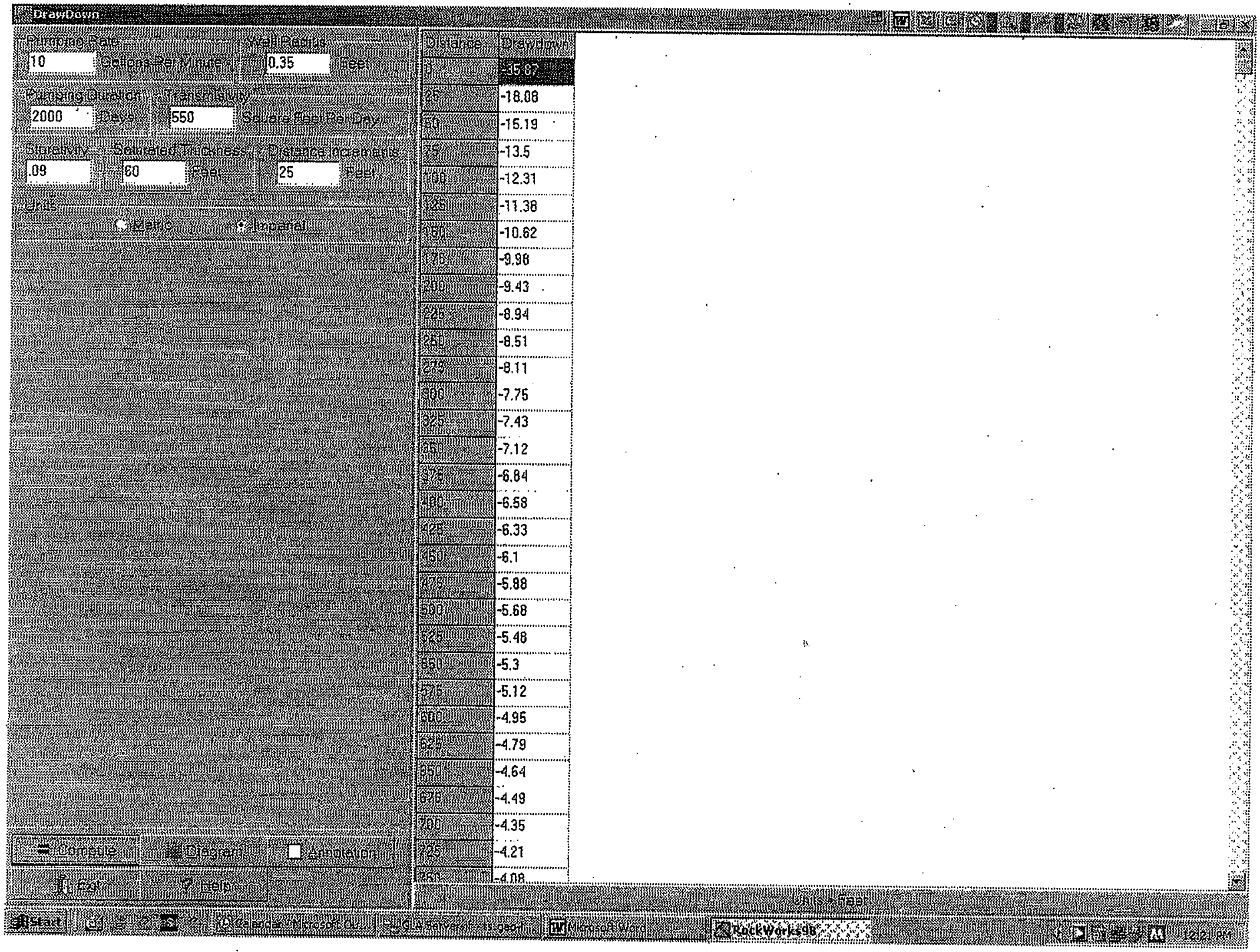

Distance	Drawdown
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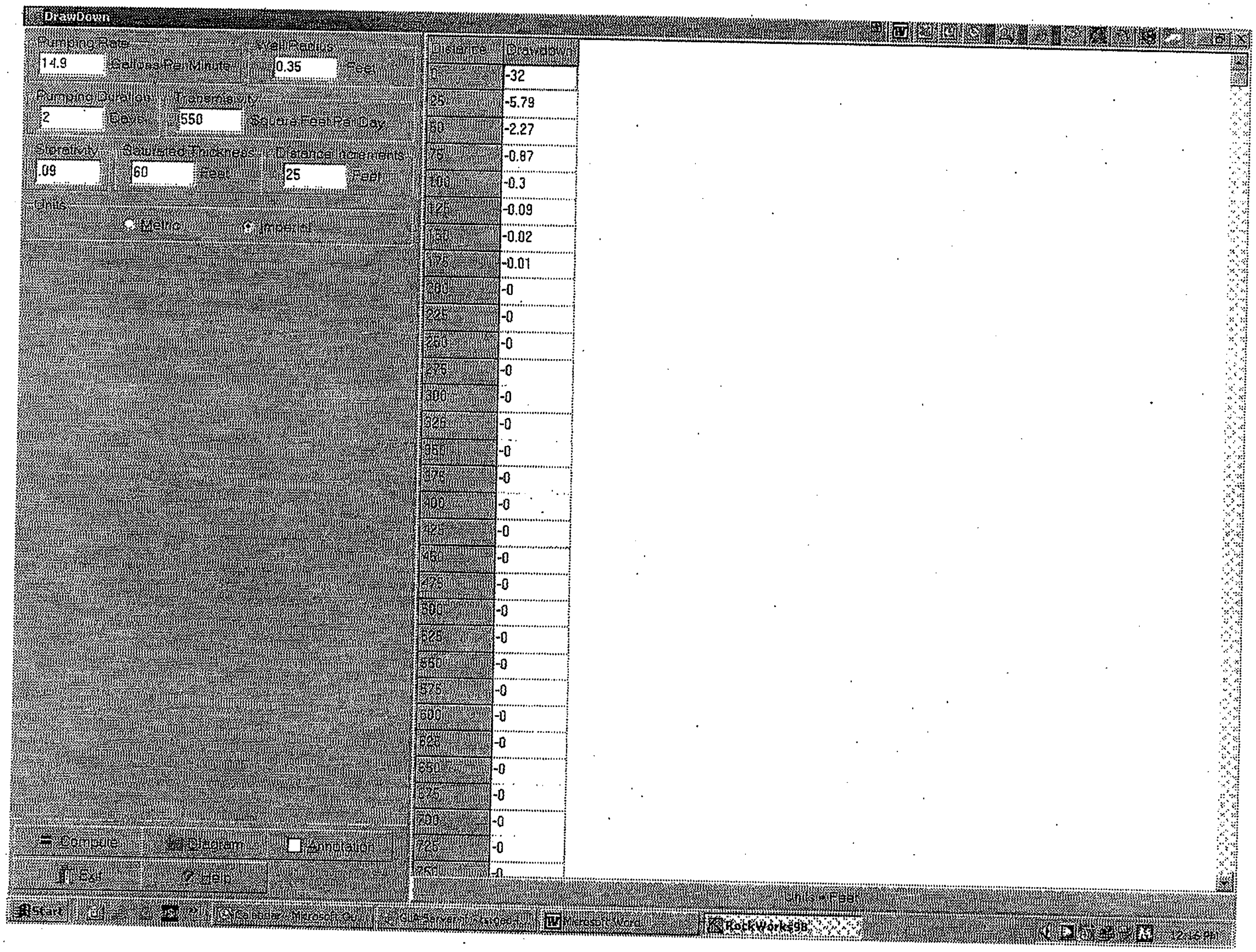
25	-18.08
50	-15.19
75	-13.5
100	-12.31
125	-11.38
150	-10.62
175	-9.98
200	-9.43
225	-8.94
250	-8.51
275	-8.11
300	-7.75
325	-7.43
350	-7.12
375	-6.84
400	-6.58
425	-6.33
450	-6.1
475	-5.88
500	-5.68
525	-5.48
550	-5.3
575	-5.12
600	-4.95
625	-4.79
650	-4.64
675	-4.49
700	-4.35
725	-4.21
750	-4.08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Gallons Per Minute
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Feet
Pumping Duration
2
Days
Transmissivity
550
Square Feet Per Day
Storativity
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Saturated Thickness
60
Feet
Distance Increments
25
Feet
Units
Metric
Imperial
Distance
Drawdown
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25 -5.79
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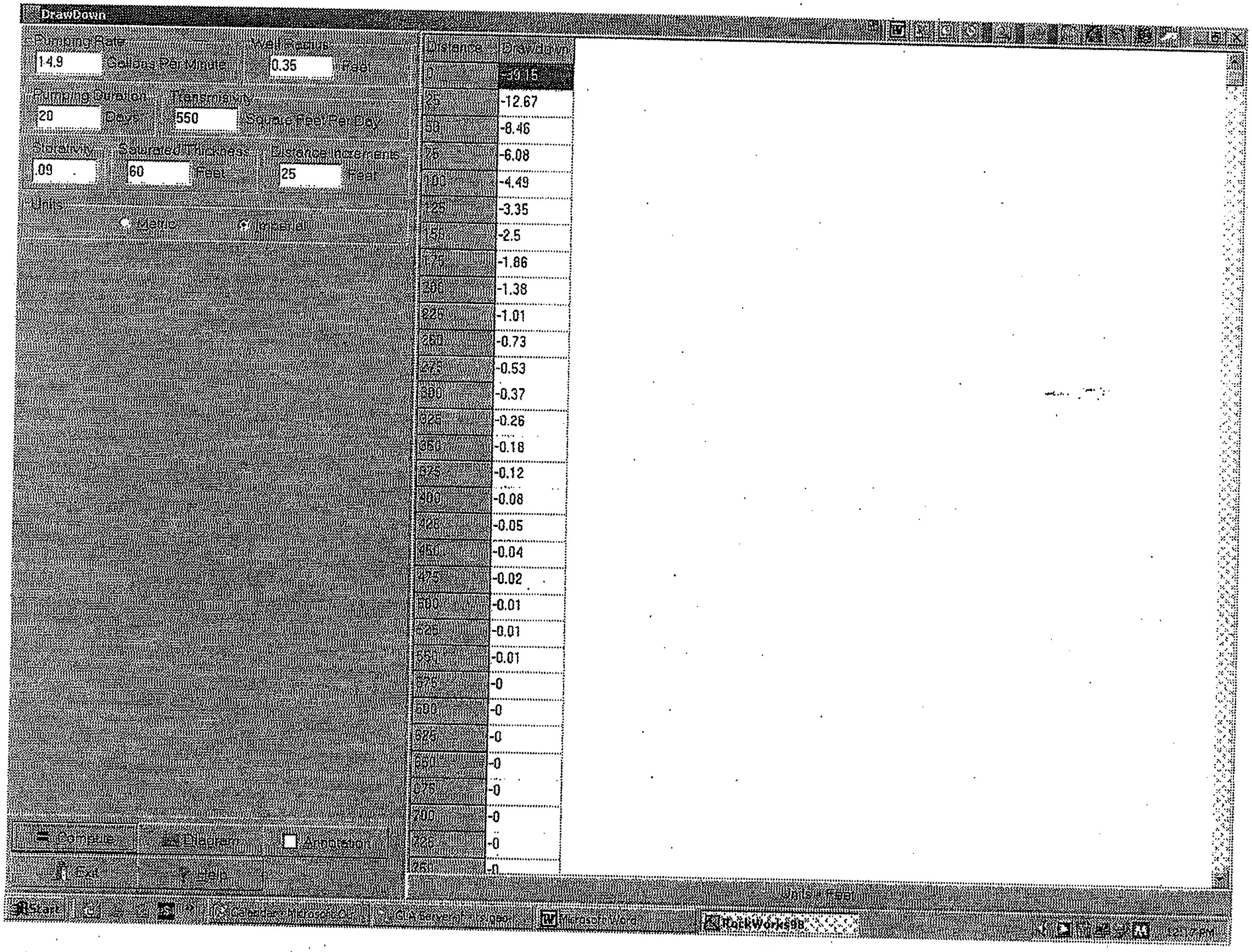
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Feet
Units
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Compute
Diagram
Annotation
Exit
Help
Distance Drawdown
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75 -6.08
100 -4.49
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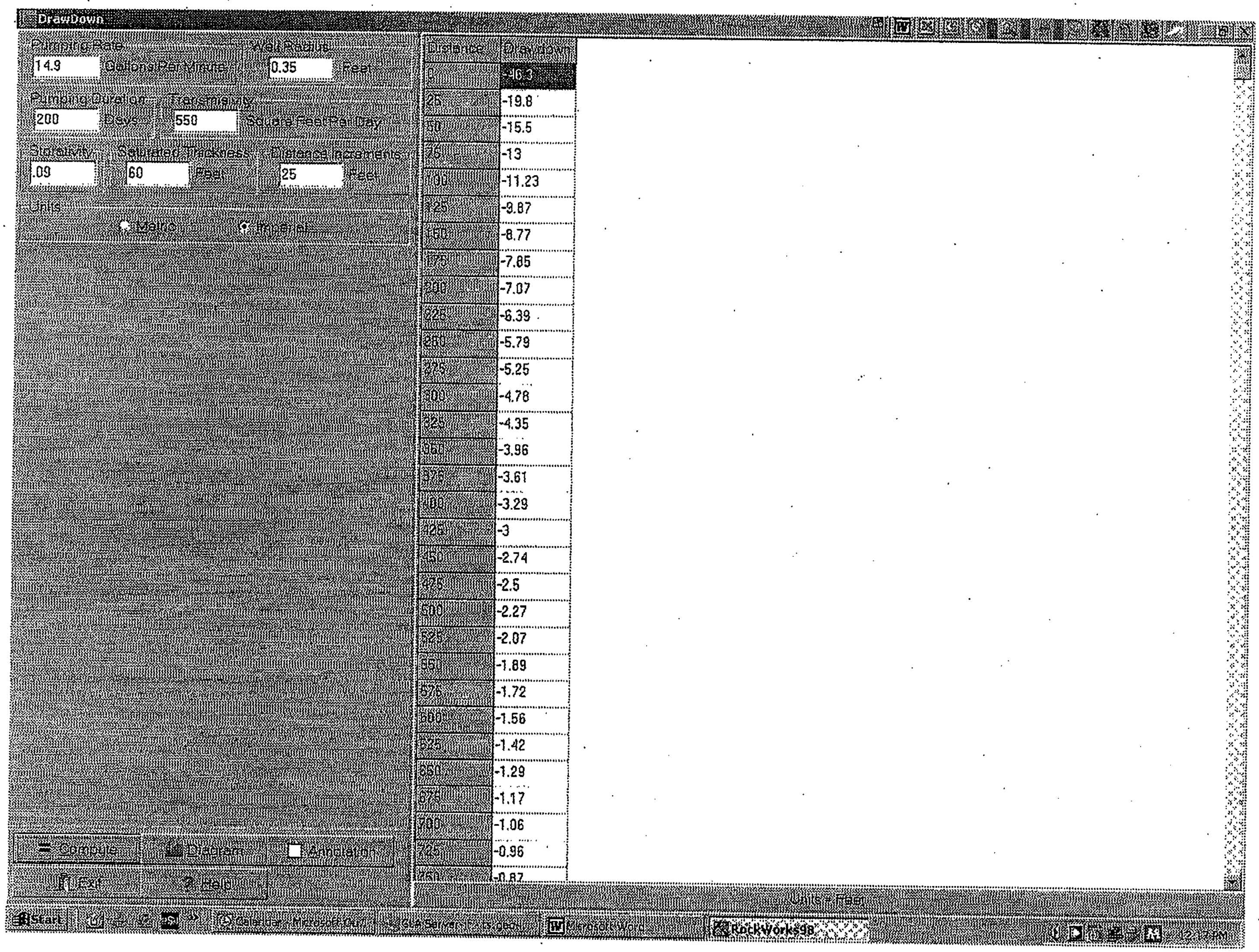
RockWorks99



DrawDown
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Well Radius
0.35
Feet
Pumping Duration
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Days
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Square Feet Per Day
Storativity
.09
Saturated Thickness
60
Feet
Distance Increments
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Feet
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75 -13
100 -11.23
125 -9.87
150 -8.77
175 -7.85
200 -7.07
225 -6.39
250 -5.79
275 -5.25
300 -4.78
325 -4.35
350 -3.96
375 -3.61
400 -3.29
425 -3
450 -2.74
475 -2.5
500 -2.27
525 -2.07
550 -1.89
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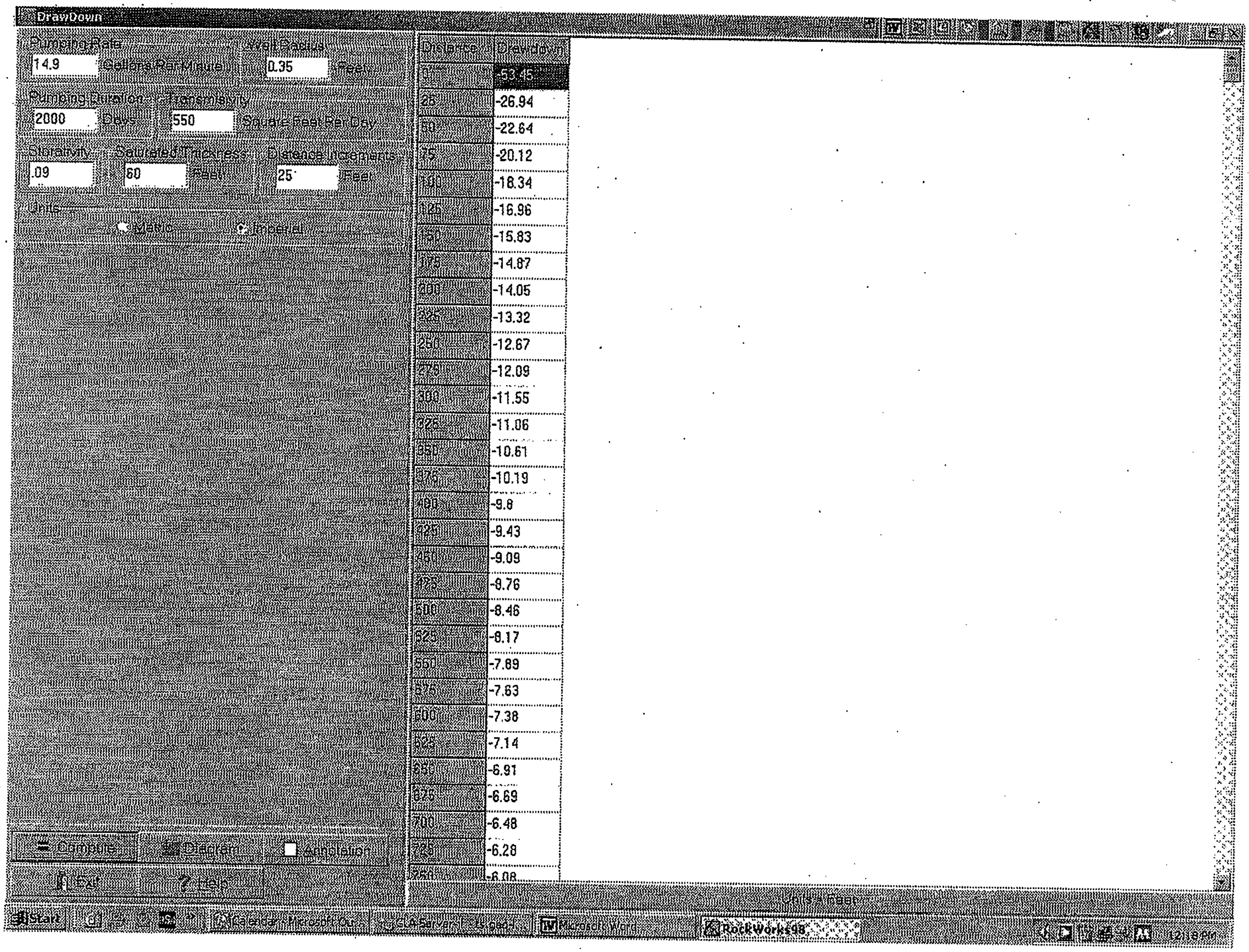
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Pumping Duration
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Days
Transmissivity
550
Square Feet Per Day
Storativity
.09
Saturated Thickness
60
Feet
Distance Increments
25
Feet
Units
Metric
Imperial
Distance
Drawdown
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25 -26.94
50 -22.64
75 -20.12
100 -18.34
125 -16.96
150 -15.83
175 -14.87
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425 -9.43
450 -9.09
475 -8.76
500 -8.46
525 -8.17
550 -7.89
575 -7.63
600 -7.38
625 -7.14
650 -6.91
675 -6.69
700 -6.48
725 -6.28
750 -6.08
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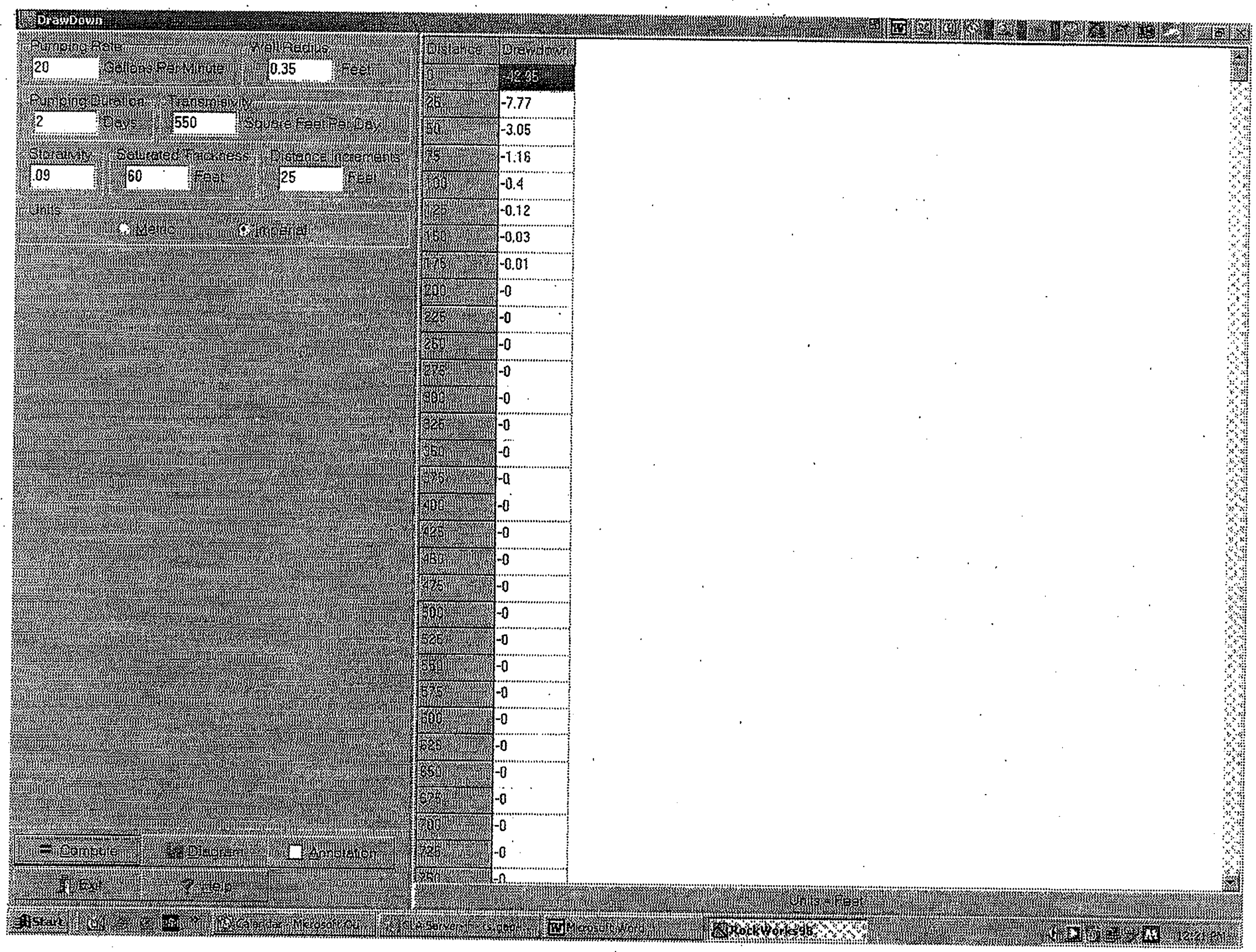
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Gallons Per Minute
Well Radius
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Feet
Pumping Duration
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Annotation
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50 -3.05
75 -1.16
100 -0.4
125 -0.12
150 -0.03
175 -0.01
200 -0
225 -0
250 -0
275 -0
300 -0
325 -0
350 -0
375 -0
400 -0
425 -0
450 -0
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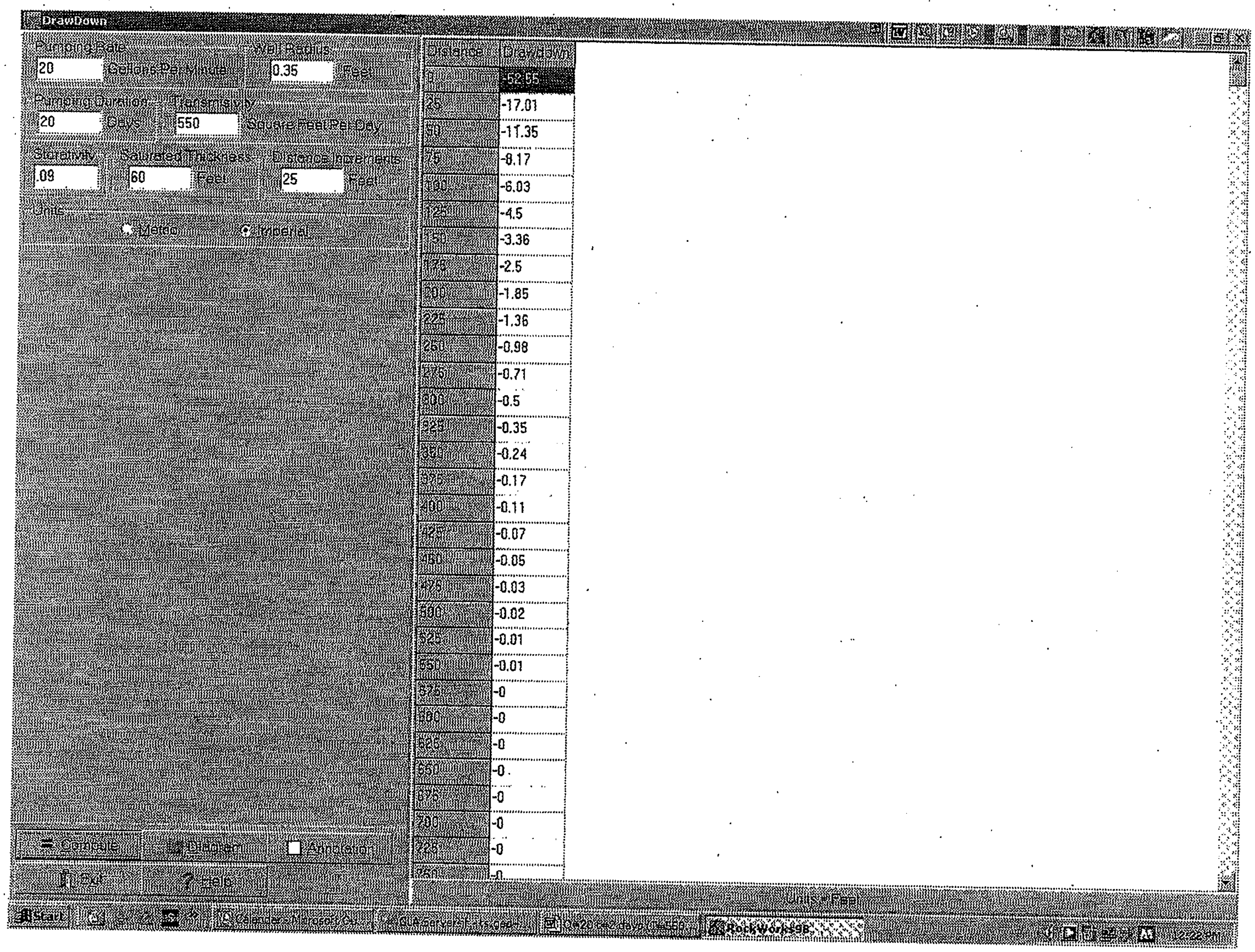

DrawDown
Pumping Rate
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Gallons Per Minute
Well Radius
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Feet
Pumping Duration
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Storativity
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Saturated Thickness
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Feet
Distance Increments
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Feet
Units
Metric
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Compute
Diagram
Annotation
Exit
Help
Distance
Drawdown
0 -52.55
25 -17.01
50 -11.35
75 -8.17
100 -6.03
125 -4.5
150 -3.36
175 -2.5
200 -1.85
225 -1.36
250 -0.98
275 -0.71
300 -0.5
325 -0.35
350 -0.24
375 -0.17
400 -0.11
425 -0.07
450 -0.05
475 -0.03
500 -0.02
525 -0.01
550 -0.01
575 -0
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650 -0
675 -0
700 -0
725 -0
Units = Feet
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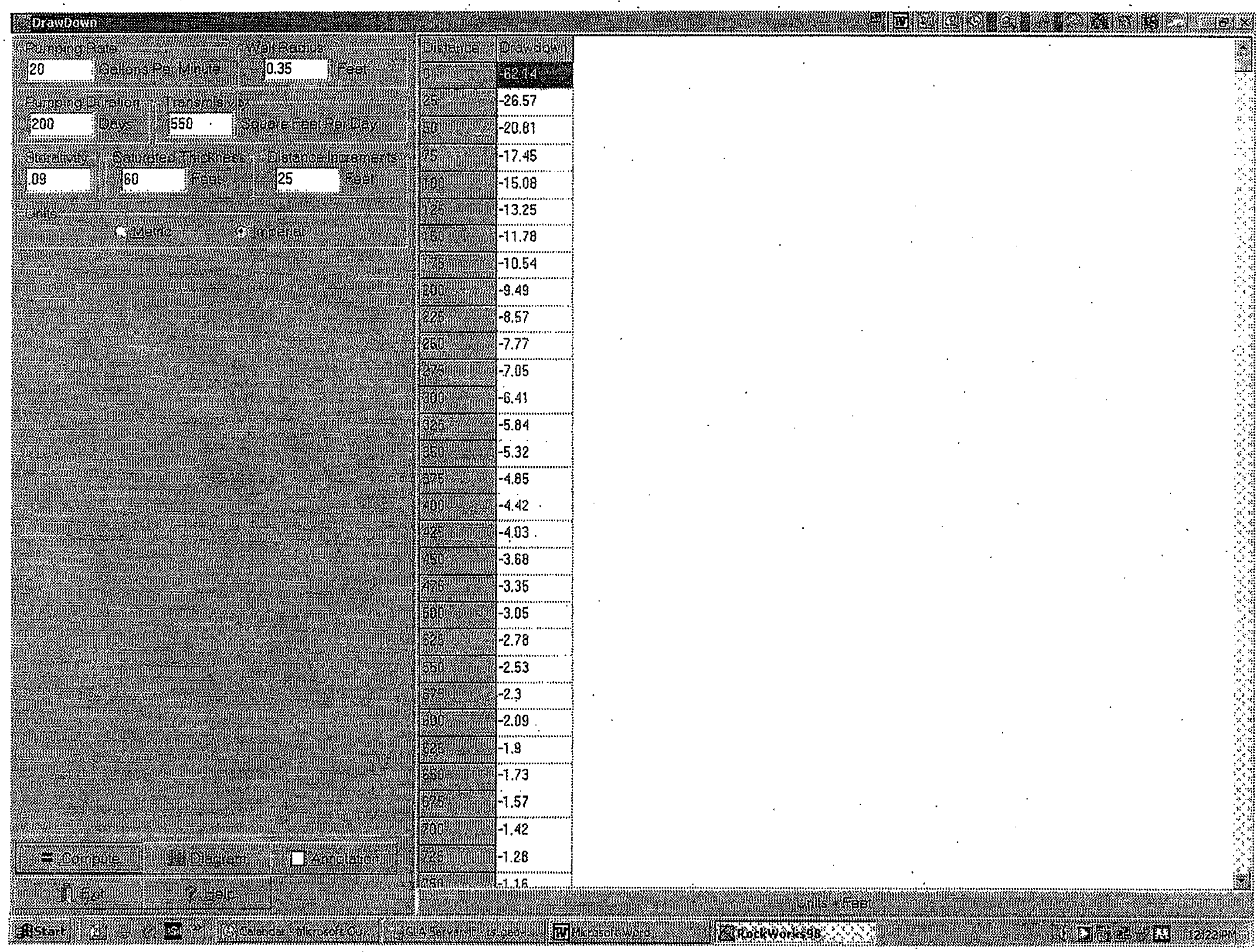
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Gallons Per Minute
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Feet
Pumping Duration
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Storativity
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Distance Increments
25
Feet
Units
Metric
Imperial
Compute
Diagram
Annotation
Exit
Help
Distance
Drawdown
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25 -26.57
50 -20.81
75 -17.45
100 -15.08
125 -13.25
150 -11.78
175 -10.54
200 -9.49
225 -8.57
250 -7.77
275 -7.05
300 -6.41
325 -5.84
350 -5.32
375 -4.85
400 -4.42
425 -4.03
450 -3.68
475 -3.35
500 -3.05
525 -2.78
550 -2.53
575 -2.3
600 -2.09
625 -1.9
650 -1.73
675 -1.57
700 -1.42
725 -1.28
Units = Feet
Start
Microsoft Word
RockWorks98

DrawDown

Pumping Rate: 20 Gallons Per Minute

Well Radius: 0.35 Feet

Pumping Duration: 2000 Days

Transmissivity: 550 Square Feet Per Day

Storativity: .09

Saturated Thickness: 60 Feet

Distance Increment: 25 Feet

Units: Metric / Imperial

Distance	Drawdown
0	-71.74
25	-36.16
50	-30.39
75	-27.01
100	-24.62
125	-22.76
150	-21.24
175	-19.96
200	-18.86
225	-17.88
250	-17.01
275	-16.23
300	-15.51
325	-14.85
350	-14.25
375	-13.68
400	-13.16
425	-12.66
450	-12.2
475	-11.76
500	-11.35
525	-10.96
550	-10.59
575	-10.24
600	-9.9
625	-9.58
650	-9.27
675	-8.98
700	-8.7
725	-8.43
750	-8.12

Compute | Diagram | Annotation

Exit | Help

Units = Feet

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MEMORANDUM

TO: E. William Hutton, P.C.

FROM: Sarah Battelle, GeoLogic Associates SHB

DATE: March 14, 2007

SUBJECT: **TREATED WATER QUALITY EVALUATION**
GREGORY CANYON LANDFILL PROJECT
SAN DIEGO COUNTY, CALIFORNIA

INTRODUCTION

At your request, this memorandum summarizes the results of an evaluation of the possible effluent limitations that may be established for disinfected tertiary treated water to be used to meet all or part of the water supply needs for the Gregory Canyon Landfill project. In performing this evaluation, Tentative Order No. 2006-0064 was reviewed. This Order was issued by the San Diego Regional Water Quality Control Board (RWQCB) to update the existing Waste Discharge Requirements (WDRs) for use of treated water from the Fallbrook Public Utility District (FPUD) Treatment Plant No. 1 Reclamation Project to include user applications within the Mission and Bonsall Hydrologic Subareas (HSAs), immediately downgradient of the Pala HSA in which the Gregory Canyon Landfill is located. All three of these HSAs are located within the San Luis Rey Hydrologic Unit.

It should be noted that following review of the Tentative Order and revisions by the RWQCB, the FPUD stated that the associated groundwater and surface water monitoring requirements in the Order were overly onerous, and would make water recycling economically infeasible. In response to this concern, the RWQCB removed the groundwater and surface water monitoring requirements. A second set of comments including submittal of a redline version of the Tentative Order by the FPUD addressed only the production and distribution of water recycling and removed the WDRs, requesting that instead each user apply for WDRs before receiving recycled water. The RWQCB rejected these revisions and recommended adoption of Order No. 2006-0064 including the WDRs. To date, based on a review of recently adopted orders by the RWQCB, the Tentative Order has not yet been adopted. If this approach is adopted, the only permit required to use Olivenhain Municipal Water District (OMWD) recycled water at the project site would be a revision to the OMWD Master Reclamation Permit.

WATER QUALITY OBJECTIVES AND BASIS FOR EFFLUENT LIMITATIONS

The RWQCB adopted the San Diego Basin Plan which establishes beneficial uses and water quality objectives (WQOs) for groundwater including the Mission and Bonsall HSAs. In establishing and presenting the effluent limitations in the Tentative Order, the RWQCB has included those constituents with WQOs within the HSAs. The following table presents the WQOs for the Mission and Bonsall HSAs and the Pala HSA.

16885 W. Bernardo Dr., Suite 305, San Diego, CA 92127 Phone: (858) 451-1136 Fax: (858) 451-1087

Analyte	Mission and Bonsall Basin WQOs	Pala Basin WQOs
TDS	1500 mg/L	900 mg/L
Sulfate	500 mg/L	500 mg/L
% Sodium	60%	60%
Manganese	0.15 mg/L	0.05 mg/L
Boron	0.75 mg/L	0.75 mg/L
Turbidity	5 NTU	5 NTU
Fluoride	1.0 mg/L	1.0 mg/L
Chloride	500 mg/L	300 mg/L
Nitrate – N	45 mg/L	15 mg/L
Iron	0.85 mg/L	0.3 mg/L
MBAS	0.5 mg/L	0.5 mg/L
Odor	None	None
Color	15 units	15 units

Source: RWQCB, San Diego Basin Plan

Notes: MBAS – Methyl Blue-Activated Substances (tests the presence of detergent in the water)
NTU – Nephelometric Turbidity Unit
NA – Not Analyzed

In the Basin Plan, the RWQCB states that point sources must be controlled to achieve the numerical WQOs in the effluent rather than in the groundwater. The Basin Plan also states that waters designated for use as domestic or municipal supply, such as the Mission, Bonsall and Pala HSAs, shall not contain concentrations of chemical constituents that exceed the maximum contaminant levels (MCLs) as specified in the California Code of Regulations, Title 22 (CCR 22). Finally, for discharges of recycled water not upgradient of municipal water supply reservoirs such as the Mission, Bonsall and Pala HSAs, the Basin Plan states that the effluent limitations will be at levels that are not less than constituent concentrations of water supply plus a typical incremental increase resulting from domestic water use, but not more than the Basin Plan WQOs.

It is clear that the effluent limits for disinfected tertiary water are established to protect the underlying groundwater based on the groundwater WQOs established for the HSA(s) in which the water is to be discharged. The RWQCB recognizes that under typical treated water applications, the water is used to support irrigation operations and higher constituent concentrations result in the fraction of the applied water which percolates to the groundwater due to evapotranspiration effects. As a result, the effluent limits frequently require constituent concentrations in the effluent to be lower than the corresponding groundwater WQOs. Consequently, the 12-month average and daily maximum effluent limits in the Order are statistically-derived from the FPUD Plant No. 1 effluent data to meet the numerical groundwater WQOs not to be exceeded more than 10 percent of the time in a one-year period in the effluent.

MAXIMUM EFFLUENT CONCENTRATIONS

In the Tentative Order, the RWQCB established incremental daily and 12-month average concentrations over water supply concentrations for those constituents with established WQOs for the Mission and Bonsall HSAs. The incremental increases were developed by the RWQCB based on actual effluent data submitted by FPUD for the disinfected tertiary treated effluent and potable supply waters from the Metropolitan Water District (MWD), the agency that supplies water to the area. From this data, the Order states that the effluent limitation that applies is either a value equal to the concentration in the water supply plus the site-specific incremental increase, or the effluent limitation, whichever is more stringent. The water supply values from the 2003 annual water quality report provided by the MWD and incremental daily maximum values are presented below with the 12-month average and daily maximum effluent limitations as provided in the Tentative Order.

Analyte	MWD 2003 Annual Water Quality – Average	Incremental Daily Maximum –Effluent Limitations	12-Month Average Effluent Limitations	Daily Maximum Effluent Limitations
TDS	487 mg/L	510 mg/L	1420 mg/L	1620 mg/L
Sulfate	171 mg/L	110 mg/L	475 mg/L	540 mg/L
Boron	0.13 mg/L	1.10 mg/L	---	---
Turbidity	0.06 NTU	---	---	---
Fluoride	0.22 mg/L	1.3 mg/L	---	---
Chloride	81 mg/L	110 mg/L	450 mg/L	580 mg/L
Nitrate and Nitrate as N	ND	---	---	---
Color	2 units	15 units	---	---

Source: RWQCB Tentative Order No. 2006-0064.

In addition, to the above listed effluent limitations, the RWQCB requires that the treated effluent comply with WQOs (MCLs) established by CCR 22 for various metals and organic compounds. However, the OMWD water has been represented to meet all CCR 22 requirements.

GREGORY CANYON EFFLUENT LIMITATIONS

Additional effluent and water quality data are necessary to develop site-specific incremental daily effluent limitations for the use of disinfected tertiary effluent and potable supply waters for the Gregory Canyon Landfill project. However, the 12-month average and daily maximum effluent limitations for TDS, chloride and sulfate can be calculated from the WQOs established for the Pala HSA. Tentative Order No. 2006-0064 establishes daily maximum effluent limitations for TDS and sulfate that are 8 percent above of their WQO, and a chloride value that is 16 percent higher than its WQO. The 12-month average effluent limitations for TDS and sulfate are 95 percent of the WQO and the chloride value is 90 percent of the WQO. Using the Pala HSA WQOs, the resultant 12-month average and daily maximum effluent limitations would be as follows:

Analyte	Pala HSA WQO	Calculated 12-Month Average Effluent Limitation	Calculated Daily Maximum Effluent Limitation	OWMD Effluent Data (12-month Average – 4th Quarter 2005)
TDS	900 mg/L	855 mg/L	972 mg/L	917 mg/L
Sulfate	500 mg/L	475 mg/L	540 mg/L	214.75 mg/L
Chloride	300 mg/L	270 mg/L	348 mg/L	259 mg/L

Comparison of the effluent data from the OMWD with the calculated 12-month average and daily maximum values indicates that the effluent meets the daily maximum values for all three constituents, and only exceeds the 12-month average value for TDS.

If the 12-month average value provided by the OMWD is representative of the current plant effluent, and it is necessary to achieve 12-month average TDS concentrations that are below 855 mg/L, the project may consider blending a small quantity of the recycled water (e.g., less than 10% of the total daily water needs of the project) with water that is processed through the on-site reverse osmosis (RO) water treatment system to create a TDS concentration that is below the calculated limit.

The RO water treatment system proposed for the project has removal efficiency of at least 98 percent for inorganic compounds, such as TDS, sodium, sulfate and chloride. In the case of TDS, recycled water having an initial TDS concentration of 917 mg/L would, after treatment, have a TDS concentration of approximately 18 mg/L. In turn, a blend of less than 1 gallon (the calculated value is approximately 0.75 gallons) of RO treated recycled water to every 10 gallons of OMWD-supplied recycled water would reduce the effluent concentration to the anticipated TDS effluent standard of 855 mg/L.

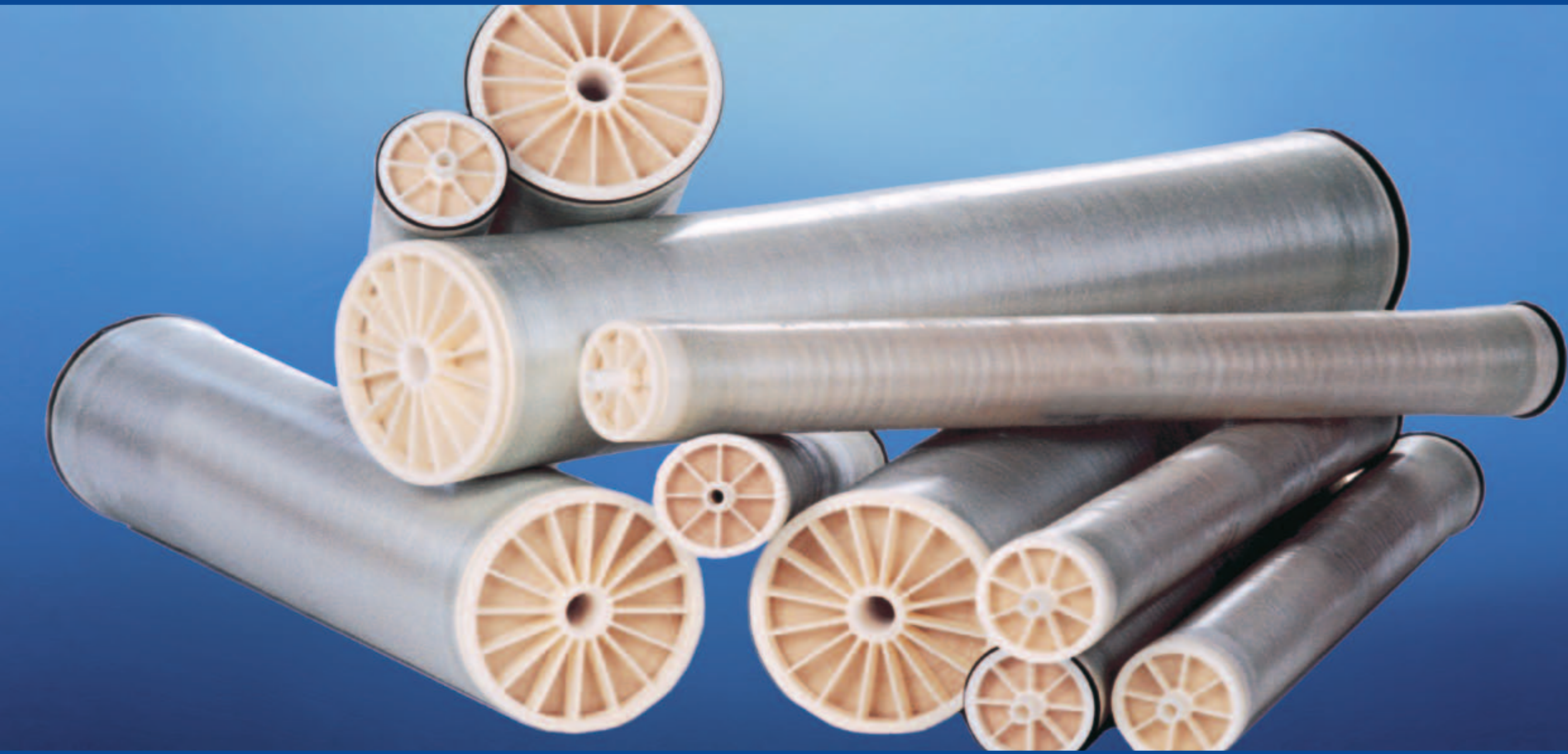
The 60 percent sodium WQO for the Pala Basin was the other constituent reported to have been exceeded in the OMWD recycled water based on a reported 12-month average of 63.42 percent sodium for the effluent during the fourth quarter 2005. Using a minimum 98 percent removal efficiency for sodium (and calcium, magnesium, and potassium, which make up the calculation of percent sodium) through the RO water treatment system, the RO treated recycled water would yield an effluent of about 1 percent sodium. Using the same blend of 0.75 gallons of RO treated recycled water with 10 gallons of OMWD-supplied recycled water, the percent sodium is reduced below the 60 percent sodium WQO for the Pala Basin to 59 percent sodium.

The 50 gallons per minute RO water treatment plant can produce up to 72,000 gallons per day of RO-treated recycled water, which represents approximately 35% of the projects maximum water requirements of 205,000 gallons per day. Thus, the RO water treatment plant can produce more than an adequate supply of water for blending, since that requirement is less than 20,000 gallons per day for blending (assuming up to 1 gallon of RO treated recycled water for every 10 gallons of OMWD recycled water) for the projects maximum daily water supply needs and achieving Pala Basin WQOs.

However, it is important to note that the majority of the site water use will occur on the landfill footprint, which is designed with redundant environmental protections within its liner system that will capture the treated water applied over it. Therefore, concerns associated with the application of treated water to the ground as is typical of irrigation operations, which may concentrate the chemical constituents by evapotranspiration and potentially pose a threat to groundwater quality, are not applicable within the footprint of the Gregory Canyon Landfill. Direct application of the treated water to the landfill will not impact the WQOs of the Pala HSA since the liner system prevents contact between the treated water and the underlying groundwater. The project should only consider providing some form of blending to water that is applied to areas that do not include the additional environmental protections (i.e., areas outside of the lined landfill footprint).

In summary, the current project includes significant environmental protections within the landfill footprint that will provide protection to the underlying groundwater and make effluent limits established for the protection of groundwater unwarranted in that area. Only in areas of the project site where the treated water is likely to be applied outside of the lined landfill do more stringent effluent limitations seem appropriate. Blending of the recycled water with RO-treated water is feasible for those applications.

If you have any questions, please call me at (858) 451-1136.



USFilter

MEMBRANE SERVICES

AND PRODUCTS

RO Membrane Product Guide

8" RO Membranes

Manufacturer	Model	GPD	% Reject (min.)
FILMTEC™	**BW30-365**	**9,500**	**99**
FILMTEC	**BW30-400**	**10,500**	**99**
FILMTEC	**BW30LE-440**	**11,500**	**99**
FILMTEC	**BW30-365FR**	**9,500**	**99**
FILMTEC	RO-390-FF	6,800	98
FILMTEC	**HSRO-390-FF**	**6,800**	**98**
FILMTEC	SW30-8040	6,000	98.6
FILMTEC	SW30HR-8040	4,000	99.2
FILMTEC	SW30HR-380	6,000	99.4
Hydranautics®	**CPA2**	**10,000**	**99.2**
Hydranautics	**CPA3**	**11,000**	**99.6**
Hydranautics	CPA4	6,000	99.7
Hydranautics	ESPA1	12,000	99
Hydranautics	ESPA2	9,000	99.5
Hydranautics	ESPA3	15,000	98
Hydranautics	LFC1	10,000	99
Hydranautics	SWC1	5,000	99.6
Hydranautics	SWC2	6,200	99.2
Hydranautics	SWC3	5,900	99.6

4" RO Membranes

Manufacturer	Model	GPD	% Reject (min.)
FILMTEC	**BW30-4040**	**2,200**	**98**
FILMTEC	BW30LE-4040	2,800	98
FILMTEC	RO-4040-FF	2,400	99.5
FILMTEC	HSRO-4040-FF	1,900	99.5
FILMTEC	SW30-4040	1,500	99.2
FILMTEC	SW30HR-4040	1,000	99.2
FILMTEC	TW30-4040	2,200	98
Hydranautics	**CPA2-4040**	**2,250**	**99.2**
Hydranautics	ESPA1-4040	2,600	99
Hydranautics	ESPA2-4040	1,900	98
Hydranautics	ESPA3-4040	3,000	98
Hydranautics	SWC1-4040	1,100	99.6
Hydranautics	SWC2-4040	1,400	99.2

Items in **RED** are stocked by USFilter. For availability of other items, please contact your local USFilter sales representative.

Standard Elements Cross-Reference Guide

8" RO Membranes

Type	FILMTEC	Hydranautics	FLUID SYSTEMS™	TriSep™	DESAL™	Osmonics™
TFC - 365 sq ft.	BW30-365	CPA2	8822HR-365	8040-ACM2-TSA		815-HF(PA)
TFC - 400 sq. ft.	BW30-400	CPA3	8822HR-400	8040-ACM2-UWA	AG8040F400	815-HF(PA)-400
TFC - LP - 400+ sq. ft.	BW30LE-440	ESPA1	8821ULP-400	8040-ACM4-UWA	AK8040F400	
TFC - LF - 365 sq. ft.	BW30-365FR	LFC1		8040-X201-TSA		
TFC - SW	SW30-8040	SWC2	2822SS-360	8040-ACMS-SSA	SE8040F	
TFC - SW	SW30HR-8040	SWC1	2822SS	8040-ACMS-SPA	AD8040F	
TFC - SW	SW30HR-380	SWC3	2822SS-360	8040-ACMS-SPA	SC8040F	
CA		CAB1	8221SD	8040-SB50-TSA	CE8040F	815-SR
CA		CAB2	8221HR	8040-SB20-TSA	CD8040F	815-HR
CA		CAB3	8221HR	8040-SB20-TSA	CD8040F	815-HR
NF	NF40-8040		8921S	8040-XN40-TSA	DL8040F	815-NF300(PA)
NF	NF70-400	8040-UHY-ESNA		8040TS80-UWA	HL8040F400	
UF		8040-TFF-P100		8040-UE50-TXA	EW8040F	815-PT3PS

4" RO Membranes

Type	FILMTEC	Hydranautics	FLUID SYSTEMS	TriSep	DESAL	Osmonics
TFC - 4040	BW30-4040	CPA2-4040	4820HR	4040-ACM2-TSF	AG4040FF	414-HF (PA)
TFC - LP - 4040	BW30LE-4040	ESPA1-4040	4821ULP	4040-ACM4-TSF	AK4040FF	
TFC - SW - 4040	SW30-4040	SWC1-4040	1820SS	4040-ACMS-SSF	SE4040FF	
TFC - TW - 4040	TW30-4040			4040-ACM2-TST	AG4040TF	
CA		CAB1-4040	4221SD	4040-SB50-TSA	CE4040F	
CA		CAB2-4040	4221HR	4040-SB20-TSA	CD4040F	
TFC-NF	NF40-4040		4921S		DL4040F	411-NF300(PA)
TFC-NF	NF70-4040	4040-UHT-ESNA		4040-TS80-TSF	HL4040FF	
UF		4040-TFV-P100		4040-UE50-TXF	EW4040F	411-PT3PS

TFC= Thin Film Composite LP = Low Pressure LF = Low Fouling SW = Seawater
TW = Tap Water NF= Nanofilter CA= Cellulose Acetate UF= Ultrafilter

YOU CHOOSE FROM
THREE LEVELS OF SERVICE

USFilter offers three levels of off-site cleaning service for your 4" and 8" elements. You choose the level of service that meets your needs and budget.

PLATINUM LEVEL CLEANING PROGRAM:

- Determination of the proper cleaning chemicals, dosage rates and sequences
- Evaluation of feedwater analysis and operation data prior to fouling
- In-house experimentation and analytical diagnostic testing, as required
- 100% of the elements pre- and post-tested
- Elements bagged, boxed, palletized and (on request) preserved
- Report issued with the membranes

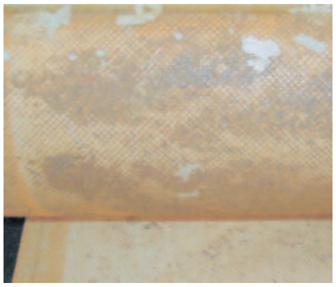
GOLD LEVEL CLEANING PROGRAM:

- Determination of the proper cleaning chemicals, dosage rates and sequences
- Evaluation of feedwater analysis and operation data prior to fouling
- In-house experimentation and diagnostic testing, as required
- Approximately 10% of the elements pre- and post-tested
- Elements bagged, boxed, palletized and (on request) preserved
- Report issued with the membranes

SILVER LEVEL CLEANING PROGRAM:

- Standard low pH followed by high pH cleaning procedures
- No pre- and post-testing
- Elements bagged, boxed, palletized and (on request) preserved
- Recommended for high volume quick turnaround applications

Dirt and debris plugging feed end of the element



Biological and silt fouling of the membrane surface

The benefits of off-site membrane cleaning:

- Improves membrane reject and flow reducing post-RO polishing costs
- Increases membrane life
- Costs less than replacement membranes
- Reduces direct labor costs
- Reduces system downtime from days to hours (especially with USFilter rental elements)
- Removes discharge of cleaning chemicals avoiding wastewater issues and plant upsets
- Eliminates record keeping and storage of cleaning chemicals
- Reduces power consumption
- Reduces water consumption and related waste disposal volume caused by fouled membranes

Optimally, membrane cleaning should be performed more as a matter of routine maintenance than by necessity. We have observed in the field that cleanup frequency varies from weekly to annually. As a general rule of thumb, USFilter recommends that systems with good feedwater quality and pretreatment require a cleanup once every three to six months as a good maintenance procedure.

ON-SITE CLEANING

USFilter can provide on-site membrane cleaning services utilizing your clean-in-place (CIP) skid and standard cleaning procedures. Depending on your needs, we can provide on-site labor and/or supervisory personnel, along with the cleaning chemicals.

OFF-SITE CLEANING

The results of off-site cleaning are dramatically different from on-site cleaning. Through the operation of over 1,000 membrane systems, USFilter's specially designed off-site membrane cleaning facilities provide better cleaning, extend membrane life and are more cost effective than on-site cleanings.

Conventional on-site cleanings can increase the life of a membrane, but the flow rates will eventually decline (see Figure 1).

USFilter's off-site cleaning process is specifically designed to restore RO membranes to or near the original manufacturer's performance specifications. Our proprietary equipment and strict cleaning process - air dosage rates, temperature and flow rates – are tightly controlled to ensure optimum cleaning performance, resulting in longer intervals between cleanings and/or replacement. The cleaning process does not affect the structural integrity of the membrane and, therefore, does not void the manufacturer's warranty.

Figures 2, 3 and 4 illustrate the dramatic gains that can be achieved with off-site membrane cleaning and recovery.

Membrane care center

USFilter Regional Membrane Care Centers

- Fallsington, PA
- Conroe, TX
- Los Angeles, CA
- Milpitas, CA
- Rockford, IL
- Jacksonville, FL
- Toronto, Ontario, Canada

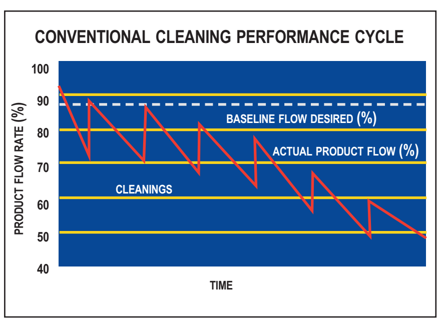


Figure 1

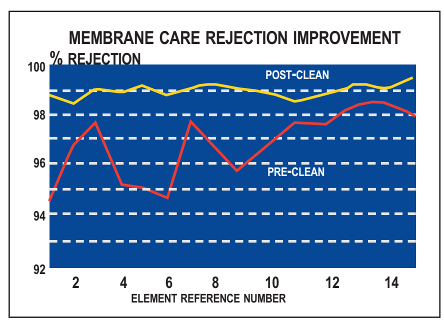


Figure 2

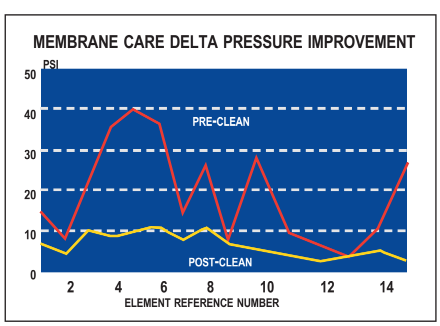


Figure 3

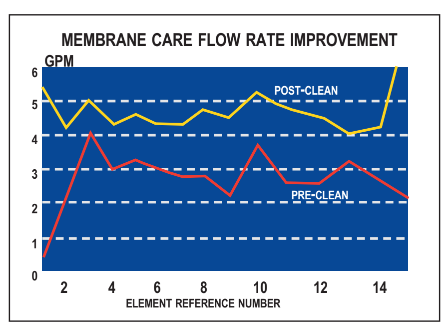


Figure 4

USFilter Regional Distribution and Stocking Facilities

- Billerica, MA
- Fallsington, PA
- Jacksonville, FL
- Rockford, IL
- Conroe, TX
- Signal Hill, CA
- Toronto, Ontario, Canada

USFilter is the innovative leader in continually defining industry standards, pioneering new techniques in system design and establishing new applications to meet high-purity water requirements. Our wide range of technologies includes the membrane purification processes - Reverse Osmosis (RO), Ultrafiltration (UF), Microfiltration (MF) and Nanofiltration (NF). We design, build, install, operate and service these systems. Our extensive operational experience is unmatched in the water industry, with responsibility for over 1,000 RO systems and 50,000+ membranes. USFilter combines proven technologies and operational experience to provide economical, reliable solutions.

USFilter's Membrane Care Program℠ provides the services and products to keep your system operating at peak performance. Whether you need our world-class design services or assistance optimizing your current membrane system, we can assist you through our Membrane Center of Excellence. This center is dedicated to developing new membranes, optimizing existing membranes and creating innovative cleaning techniques.

USFilter is your single source for all replacement membranes, accessories and parts. In addition to our large inventory of membranes and replacement parts, our trained service technicians can provide assistance with membrane removal, installation and/or cleaning (on- or off-site). We offer membrane autopsies and complete laboratory services to evaluate system performance and improve productivity. Our service contracts provide peace of mind knowing your system is being monitored and maintained by trained USFilter technicians. They ensure your system is operating at peak design levels and downtime is minimized, so you can concentrate on your core business. At USFilter, we have the right products and services to meet your needs and budget.

Your water purification system is a long-term investment. It makes sense to protect your investment by partnering with USFilter for long-term performance and reliable, continuous service.

USFILTER CAPABILITIES

- Large inventory of stocked membranes – FILMTEC and Hydranautics
- 7 regional membrane care centers
- 24-hour customer service
- Same day shipment of stocked membranes
- RO accessories and cleaning chemicals
- Rental RO membranes
- Extensive analytical and laboratory testing
- Data analysis, normalization and technical system evaluation
- Complete off-site membrane cleaning, performance recovery and testing services
- On-site membrane cleaning services
- Service and maintenance contracts
- Trained technical and service phone support staff
- Troubleshooting and field engineering support
- Local support and service network
- Personnel training
- Mobile RO systems for long or short term requirements

YOUR FULL SERVICE MEMBRANE SUPPLIER

We understand how important it is for your membrane system to operate reliably and economically. That's why we offer a wide range of cost-effective aftermarket products to keep your system up and running. From replacement membranes and system components to cleaning chemicals, we have the products when and where you need them.

REPLACEMENT MEMBRANES AND SYSTEM COMPONENTS

Membrane Components

USFilter is your leading source for replacement membranes. We supply elements from all of the major manufacturers. For your convenience, we inventory FILMTEC and Hydranautics membranes at our seven regional distribution facilities. This enables us to meet short lead times and thereby minimize your system's downtime. Whether it involves normal wear-and-tear replacement, maintenance or spares inventory, USFilter has the products to support your membrane system. In addition to our inventory of elements, our regional distribution facilities also stock major components, such as replacement gauges, pumps and end caps. USFilter can deliver the part you need in the time frame you need it.

MEMBRANE FOULING AND THE RIGHT CLEANING CHEMICALS

RO FOULING COMPONENTS

Metal Oxides
- Iron
- Manganese
- Aluminum

Scaling Salts
- Calcium Carbonate
- Calcium Sulfate
- Barium Sulfate
- Strontium Sulfate
- Calcium Fluoride
- Silica

Colloids (SDI)
- Silica
- Clay
- Silt
- Rust

Organic (TOC)
- Humic Acids and Other Natural Organics
- Coagulants - Flocking Agents
- Incompatible Pretreatment Chemicals

Biological
- Organic Slimes
- Bacteria

The membrane separation process utilizes a high-pressure feed to force water through a semipermeable barrier. As the water passes through the membrane, contaminants are rejected and eventually flushed away to a wastestream. The concentration of the contaminants is a critical factor in the design and operation of a membrane system. During normal operations, membranes can become fouled by scaling salts, inorganic oxides, colloidal material, or biological matter.

Fouling involves the entrapment of material in the feed/brine path or deposits on the surface of the membrane. These deposits can accumulate until they cause a loss in productivity, increase in feed pressure requirements, loss of salt rejection, or all three.

USFilter can determine the source of your fouling problem and make recommendations on the selection and purchase of proper chemical treatments and, if necessary, appropriate pretreatment steps. Our broad membrane system expertise enables us to provide reliable diagnosis methods and sound troubleshooting to return your equipment to optimum performance. We are able to work with all the RO chemical manufacturers and provide you with the best combination RO antiscalants, chemical feed systems and dosing rates to keep your RO system running smoothly.

COMPLETE SERVICES FOR YOUR MEMBRANE SYSTEM

At USFilter, our customers are our number one priority – before and after the sale. USFilter's professional services not only help you select the right water treatment system, but we also offer complete support at every phase throughout the life of your system. These services include water quality analyses, system installations and start-ups, membrane cleanings and maintenance contracts.

MEMBRANE CENTER OF EXCELLENCE ANALYTICAL SERVICES


Example of destructive autopsy

USFilter is committed to providing the services required to keep your water treatment systems operating at peak performance. Our analytical testing includes feedwater and outlet water analyses and various membrane analytical techniques. Our Membrane Center of Excellence can provide feed, concentrate and permeate water analyses, SDI pad analyses and various membrane analytical techniques. These include non-destructive, destructive and complete autopsies and optimum cleaning analyses. Membrane analysis assists in identifying the fouling agent(s), proper cleaning techniques and proper pretreatment methods to prevent reoccurring fouling.

NON-DESTRUCTIVE TESTS:
- External visual exam
- Bubble test - physical integrity of the membrane envelope tested
- Membrane performance testing – flux, pressure and percent reject
- Analysis of cleaning solution

DESTRUCTIVE TESTS:
- Internal visual exam
- Coupon testing of membrane surface
- Dye testing
- Metals analyses
- Digestion – ICP
- SEM EDX

ORGANIC ANALYSES:
- FTIR spectroscopy
- HPLC–FTIR and/or UV spectroscopy
- GCMS spectroscopy
- Loss on ignition – organic vs. inorganic foulants
- Fujiwara test – chlorine oxidation of polyamide elements

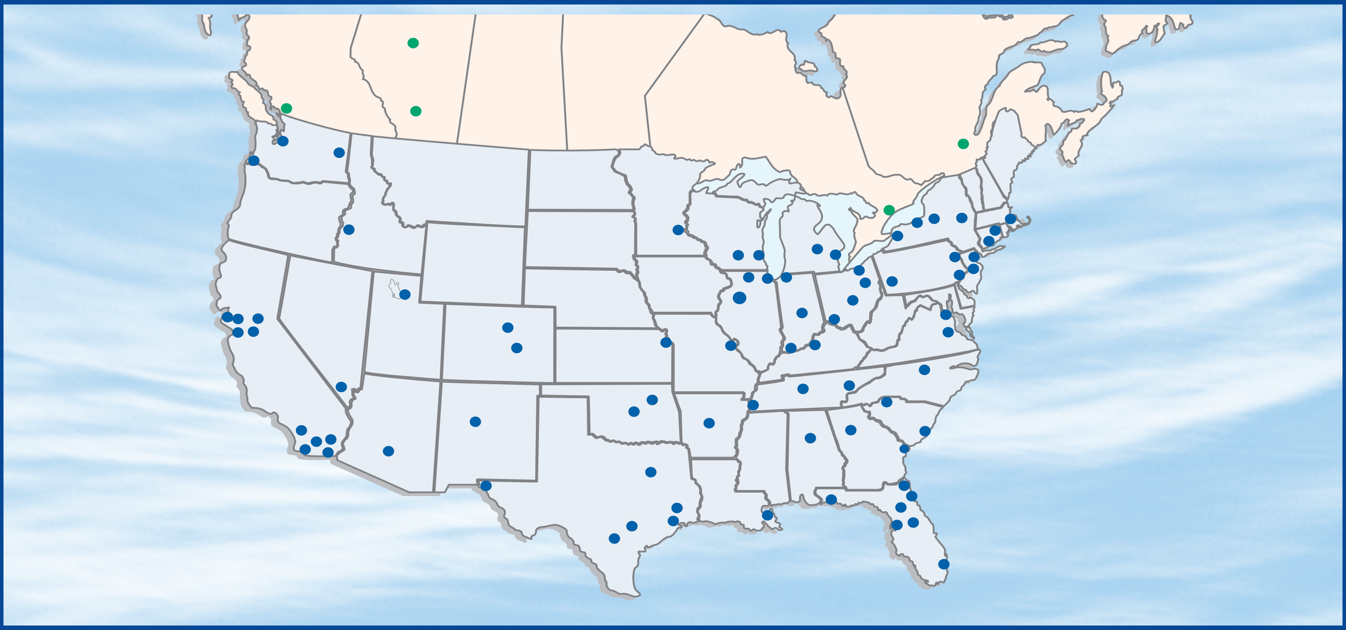
CONTRACT SERVICES

Flexibility plays a major role in USFilter's service strength. Customer-tailored maintenance agreements can be designed to meet any need and budget. Selection of services, service frequency and billing configurations are determined by your needs and can be upgraded at any time. Agreements can include warranty extensions, preventative maintenance, emergency repair, parts and expendables.

LOW FOULING MEMBRANES AND ORGANICS

USFilter was instrumental in the development of low fouling membranes by the manufacturers; however, they were not the sole answer to tough organic fouling applications. USFilter developed a proprietary RO system operation protocol to significantly reduce membrane fouling. The combination of low fouling elements with the operation protocol has changed the cleaning frequency from weekly to once every 4-6 months in some cases. If you have a tough organic fouling problem, USFilter has the answer.

WITH OVER 80 SERVICE CENTERS IN NORTH AMERICA, USFILTER IS READY TO SERVE YOU QUICKLY AND EFFICIENTLY



North America Customer & Technical Service Network

In the Continental United States

800.466.7873 *24 hour Customer Service*

800.435.3223 *Mobile Hotline*

800.582.5261 *Technical Support*

4669 Shepherd Trail

Rockford, IL 61103

In Canada East (Toronto)

905.890.2803 *24 hour Customer Service*

In Canada West (Calgary)

403.250.2650 *24 hour Customer Service*

or contact your local USFilter branch

www.usfilter.com

WTC-MEM-BR-0905

GeoLogic Associates
Geologists, Hydrogeologists and Engineers

MEMORANDUM

TO: E. William Hutton, P.C.

FROM: Sarah Battelle, GeoLogic Associates SAB

DATE: March 16, 2007

SUBJECT: **APPLICATION OF PRODUCTION AND EXTRACTION WELLS FOR GROUNDWATER MONITORING PROGRAMS GREGORY CANYON LANDFILL PROJECT SAN DIEGO COUNTY, CALIFORNIA**

At your request, this memorandum documents the practice of using production wells, including domestic water wells, and groundwater extraction wells as part of routine groundwater monitoring programs at solid waste facilities. In our experience with groundwater monitoring and reporting programs at about 70 solid waste facilities within the State, production and groundwater extraction wells are sometimes included in the monitoring program to provide water chemistry data in the vicinity of the particular well. GLA is aware of many production and domestic wells included in monitoring programs including domestic/water supply and production wells adjacent to the Crazy Horse, Johnson Canyon, Jolon Road, Forward, Bonsall, and Twenty-Nine Palms Landfills, and groundwater extraction wells used as sampling points at the Otay, Ramona, Sycamore, and San Marcos landfills.

It should be noted that the purpose of the groundwater monitoring program is to obtain a "sample" of the groundwater in the vicinity of the well. Often, for production wells and groundwater extraction wells, the sample that is collected represents the water that is pumped to the surface for its collection and site use, or human consumption, as applicable. The water chemistry data obtained provide the information needed to evaluate the acceptable nature of the water at the discharge point for site use/consumption. This type of sample is representative of the groundwater under a routine, pumped condition. Using this same sampling method over time, the most recent water chemistry data can be compared with the historical data to assess changes in the chemistry.

To collect a sample that more closely represents the *in-situ* groundwater (i.e., groundwater before it is pumped to the surface), the pump rate may be reduced to produce the least effect (i.e, low turbidity, low levels of mixing and agitation) on the groundwater drawn to the surface. At the Gregory Canyon Landfill site, it is proposed that the pump controller be equipped with a variable frequency drive to allow for a lower flow rate for this purpose. In addition, it is recognized that pumping wells that are water level measuring stations must be shut off for at least a day to allow the water level to reach static conditions before a water level measurement is taken.

If you have any questions, please call me at (858) 451-1136.

16885 W. Bernardo Dr., Suite 305, San Diego, CA 92127 Phone: (858) 451-1136 Fax: (858) 451-1087